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Learned delegates present in the 2nd academic (CME) meet of IJHRMLP on 17th July 2016 (Theme: Academic Scholarship)



Learned delegates present in the CME program on "Organ Donation & Preservation of Dead Bodies" organized by Dr. Rup Sekhar Deka, Associate Professor of Anatomy, Gauhati Medical College, Guwahati, Assam, India and his team cum Associate Editor of IJHRMLP on 31st Aug'16 in association with IJHRMLP



Seminar on Oncology organized by Dr. B. Borooah Cancer Institute in association with Tezpur Medical College, Tezpur, Assam, India on 2nd Sept'16. Prof. Nirmal Ch. Bhattacharyya, Principal of TMC & Associate Editor of ijhrmlp was awarded the life time achievement award in this function

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EDITORIAL

The revised guidelines of the Medical Council of India for academic promotions: Need for a rethink

Aggarwal Rakesh¹, Gogtay Nithya², Kumar Rajeev³, Sahni Peush⁴ (for the Indian Association of Medical Journal Editors*)

*The following members of the Indian Association of Medical Journal Editors (IAMJE) also endorse this editorial:

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Note: This editorial is being published simultaneously in the *Indian Heart Journal*, *Indian Journal of Anaesthesia*, *Indian Journal of Gastroenterology*, *Indian Journal of Medical Ethics*, *Indian Journal of Medical Microbiology*, *Indian Journal of Occupational and Environmental Medicine*, *Indian Journal of Pathology and Microbiology*, *Indian Journal of Pharmacology*, *Indian Journal of Physiology and Pharmacology*, *Indian Journal of Urology*, *Indian Pediatrics*, *International Journal of Health Research & Medicolegal Practice*, *Journal of Anaesthesiology Clinical Pharmacology*, *Journal of Ayurveda and Integrative Medicine*, *Journal of Clinical and Scientific Research*, *Journal of Conservative Dentistry*, *Journal of Family Medicine and Primary Care*, *Journal of Indian Academy of Forensic Medicine*, *Journal of Mahatma Gandhi Institute of Medical Sciences*, *Journal of Postgraduate Medicine*, *National Journal of Integrated Research in Medicine*, and *The National Medical Journal of India*. It may also be published in forthcoming issues of other journals.

This editorial is not endorsed by all members of the IAMJE.

Measuring academic achievements is never an easy task. This is particularly so when individuals are assessed for promotions in several fields with differing job descriptions. Assessment by peers is time-consuming and may be prone to bias; thus, objective criteria are required to minimize these concerns.

The Medical Council of India (MCI) has laid down guidelines for appointments and promotions of teachers in medical institutions in India. Among the criteria used for promotions, publication of research is an essential requirement. Though the need for this requirement has been debated, it is believed that the quality of teaching improves when medical teachers are involved in research. Many countries have made it mandatory for their medical faculty to do research; some other countries incentivize the conduct and publication of research. Reports have also lamented that the physician–scientist might become an endangered species.^{1,2} Thus, linking publications with promotions might benefit both the individual and society. The flip side is that the time spent on research might take teachers away from teaching or clinical duties, particularly in under-staffed specialty departments. Further, the quality of research is likely to be poor when the resources and training in research are lacking.³ Poor quality may even discredit research as a professional activity. Insistence on a certain amount of published research to maintain teaching credentials may lead to the phenomenon of ‘publish or perish’.⁴ Finally, it is important to consider that biomedical research may, at times, be relevant to non-biomedical journals

and criteria for awarding credit to such publications should also be devised.

The MCI requires that the medical faculty engages in research. One measure to achieve this goal is the mandatory ‘thesis’ for postgraduate (Masters; MD/MS/DNB) and post-doctoral (DM/MCh/DNB) courses. Each student, regardless of specialty, is required to undertake a research study with a faculty member as the guide and often one-to-a-few faculty members from the same or related subjects as co-guides. Apart from providing training in doing research, the thesis is expected to inculcate an appreciation for research methodology and critical analysis. This experience is relevant to students who will become full-time researchers, and is also beneficial to medical practitioners who may never conduct further research but should be able to discern the merits of newer management options for their patients.

The MCI’s initial guidelines for promotion to the position of Associate Professor and Professor required publication of at least two research papers by the candidates.⁵ In September 2015, the MCI issued a ‘clarification’ on what constitutes ‘research publications’ for promotion of teaching faculty of medical colleges/institutions in India (Box 1).⁶ This ‘clarification’ raises the following issues.

E-journals

The new guidelines stipulate that publications in e-journals will

not be considered for promotion. This guideline is probably in response to the proliferation of predatory journals, almost exclusively among e-journals, over the past five years. It is worrying that the largest number of authors and publishers seem to be from India.⁷ Predatory publishing is perhaps a manifestation of the ‘publish or perish’ phenomenon with authors willing to pay for a publication.⁷

While the MCI’s corrective measure is laudable, the definition of ‘e-journals’ is variable.⁸ We assume that the MCI implies e-journals are those that do not have a print version. This guideline would exclude many high-quality journals that are published only in the electronic format, e.g. the PLoS group of journals, the Biomed Central (BMC) journals, *British Journal of Clinical Pharmacology*, and *New Zealand Medical Journal*. It might also exclude journals that publish papers in a longer e-version and a shorter print version (*BMJ*). Many believe that ‘paper journals’ of niche specialties (with limited circulation) may soon cease to appear. Publishing is rapidly shifting to the electronic format and an explosive growth in e-journals is envisaged. Thus, the embargo on all e-journals seems unfair. The main objective of this guideline appears to be to limit predatory publishing and to ensure quality. This can be achieved by insisting on other criteria such as indexing, because reputed indexes are unlikely to include predatory journals.

Indexing

Indexation or inclusion in select databases is an imperfect surrogate for quality. A more direct measure would probably be an assessment of each individual journal by peers. Till such an evaluation is available, we agree with the MCI’s requirement that the journal of publication be listed in a recognized database. However, we suggest that the list of databases provided in the MCI’s order needs a re-look. For example, Index Copernicus was last updated in 2014.⁹ Some journals listed on this index, and their publishers appear on Beall’s list of potentially predatory journals.¹⁰ In fact, Beall’s blog says “Index Copernicus has no value”.¹¹ Although the MCI’s order lists Medline and Index Medicus separately, these are actually one database. Similarly, PubMed is not a database but a search engine that searches various databases including Medline and PubMed Central. More important is the omission of Science Citation Index, an important database currently published by Thomson Reuters and of IndMed, a database of Indian medical journals, curated by the Indian Council of Medical Research. We suggest the following list of acceptable databases: Medline, PubMed Central, Science Citation Index, Embase/Excerpta Medica, Scopus and IndMed.

Article types

The MCI guideline states that only ‘Original research articles’ and ‘Original research papers’ will be eligible for consideration. The objective here appears to be to include papers with original data and to exclude case-reports and reviews or opinions. However, this guideline is not precise because different journals

classify original research variously under these two and some other sections, such as brief communications, short reports, etc. Further, this clause discredits meta-analyses and systematic reviews that involve scientific interpretation of original data. Instead of prescribing specific article-type labels, the MCI could suggest that the paper should report ‘original research data or its interpretation in a meta-analysis or systematic review’.¹² The guidelines’ implication that case reports, reviews and opinion pieces should not carry any value remains debatable since these are an important part of scientific dialogue.

National versus international journals

The distinction between ‘national’ and ‘international’ journals is unclear. The inclusion of words such as ‘India’ or ‘Indian’ in the title does not necessarily make a journal of lesser quality. Similarly, the presence of words such as ‘international’, ‘global’ or ‘world’ in a journal’s name does not confer it with a higher quality. National journals are in fact more likely to publish research that is relevant to the local population. Again, this discrimination by the MCI appears to be a surrogate marker for quality. Since indexing has already been included as a criterion, the terms ‘national’ and ‘international’ have little value. We also suggest that the criterion of society journals be removed as indexation covers the quality requirements. The quality of a number of non-society journals (for example *The Lancet*) is widely recognized.

Place in authorship sequence

Finally, the MCI guideline of limiting credit to only the first two authors of a paper is too restrictive. This guideline seems to be an attempt to weed out the malpractice of gift authorship. Again, the MCI’s aim is laudable but the implementation can result in greater harm. The first name in a paper is generally associated with the person who did the maximum work and the last name being that of the supervising senior.¹³ The MCI guideline suggests that other names except the first two on the byline are those of ‘guests’.

The research scenario has moved towards collaborative and multidisciplinary projects conducted by large teams. To publish a paper in a high-quality journal, a researcher needs to look at a research problem from diverse aspects (e.g. clinical, laboratory, genetics, and immunology). Hence, good papers often have multiple authors with equal contribution, and all of them deserve equal credit.

The MCI guideline may not only deny credit to all those who have contributed, it may even encourage the practice of denying first authorship, and credit, to junior researchers whose contribution is often the maximum. Experience of many medical editors shows that it is not uncommon to find the senior-most author as the first author (even in case reports) due to the premium placed on this position.¹⁴ Therefore, we suggest that this guideline should be removed, and all the authors of a paper should receive credit for it.

We appreciate the MCI's intention to give research its due recognition in academic institutions as well as for streamlining the process of promotion of teachers. Our suggestions to amend the existing guidelines, summarized in Box 2, can help remove ambiguities in the new MCI guidelines. These could also serve as the starting point of a wider consultation on the evaluation of research performance of medical teachers in India.

Box 1: Guidelines for counting research publications for promotion of teaching faculty of medical colleges/institutions in India as laid down in an order by Medical Council of India in September 2015

- a. **Index agencies:** Scopus, PubMed, Medline, Embase/Excerpta Medica, Index Medicus and Index Copernicus
- b. **Types of articles to be considered:** Original research articles and original research papers.
- c. **Criteria for National/International journal:** Published by a National/International – specialty journal/journal of a national/international society provided it included in one of the indexes mentioned above.
- d. **Authorship:** First author, second author
- e. **E-journals:** E-journals not included

The above would also be applicable for 'accepted for publication' papers/articles.

Box 2: Our suggestions

- a) Acceptable databases:
Medline, PubMed Central, Science Citation Index, Embase/Excerpta Medica, Scopus and IndMed
- b) Types of articles to be considered:
Articles reporting original research data or their interpretation in a meta-analysis or systematic review
- c) Authorship:
All authors

REFERENCES

- Rosenberg LE. Physician–scientists—endangered and essential. *Science* 1999;**283**:331–2.
- Wyngaarden JB. The clinical investigator as an endangered species. *N Engl J Med* 1979;**301**:1254–9.
- Gitanjali B. Identifying a research topic: The problem is the problem... *Indian J Pharmacol* 2005;**37**:67–8.
- Colpaert J. The 'publish and perish' syndrome. *Comput Assist Lang Learn* 2012;**25**:383–91.
- Medical Council of India. Minimum qualifications for teachers in medical institutions regulations, 1998 (Amended up to May 2015) Available at <http://www.mciindia.org/Rules-and-Regulation/TEQ-REGULATIONS-16.05.15.pdf> (accessed on 21 Dec 2015).
- Medical Council of India. Clarification with regard to research publications in the matter of promotion for Teaching faculty in a medical college/ Institutions. Available from: <http://www.mciindia.org/circulars/Circular-03.09.2015-TEQ-Promotion-Publication.pdf> (accessed on 8 Dec 2015).
- Shen C, Bjork BC. 'Predatory' open access: A longitudinal study of article volumes and market characteristics. *BMC Medicine* 2015;**13**:230.
- Llewellyn RD, Pellack LJ, Shonrock DD. The use of electronic-only journals in scientific research. *Issues Sci Technol Librariansh* 2002; 32: doi: 10.5062/F41V5BZM.
- Index Copernicus International. <http://en.indexcopernicus.com/> (accessed on 1 Dec 2015).
- Beall's List: Potential, possible, or probable predatory scholarly open-access publishers. Available from: Index Copernicus International. Available from: <http://scholarlyoa.com/publishers/> (accessed on 20 Dec 2015).
- Index Copernicus Has No Value. Available from: <http://scholarlyoa.com/2013/11/21/index-copernicus-has-no-value> (accessed on 20 Dec 2015).
- Bandewar SVS, Pai SA. Regressive trend: MCI's approach to assessment of medical teachers' performance. *Indian J Med Ethics* 2015;**12**:192–5.
- Zbar A, Frank E. Significance of authorship position: An open-ended international assessment. *Am J Med Sci* 2011;**341**:106–9.
- Goel A, Kumar S, Mandhani A, Panda A, Kumar R. Authorship misconduct in a small specialty journal: A retrospective review. Poster presentation at the First WAME International Conference for Medical Journal Editors, 2–4 Oct 2015, New Delhi, India.

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REVIEW PAPER

Forensic Odontology and its Medico Legal Issues

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ABSTRACT

Forensic Odontologists deals with the proper examination, handling and presentation of dental evidence in a court of law. They are to help in identification of bite marks on the victims of attack or in other substances such as wood, leather and food stuffs and to compare bite marks with the teeth of a suspect and presentation of this evidence in court as an expert witness. They are to identify unknown bodies through dental records and to estimate age from teeth; however forensic Odontologist can still contribute to the identity investigation in the absence of dental records through profiling the deceased using features related to teeth. Teeth with their physiologic variations, pathos and effect of therapy record information that remains throughout life and beyond. This article explores an insight to forensic odontology and outlines some of its medico-legal applications in criminal investigations.

Keyword: *Odontology, Dental records, Identification, Violence*

INTRODUCTION

The roles of any expert in forensic dentistry are to collect, preserve and interpret trace evidence, then to relay the results to the judicial authority. Those functions require sound knowledge in dealing with crime scenes investigation and sufficient acquaintance in law.

The use of teeth as evidence is not recent. There are historical reports of identification by recognizing specific dental features as early as 49 A.C. However, forensic odontology, as a science, did not appear before 1897 when Dr. Oscar Amoedo wrote his doctoral thesis entitled “**L’art dentaire en medecine legale**” describing the utility of dentistry in forensic medicine with particular emphasis on identification.¹

Traditionally, forensic odontology covered various topics that can be broadly classified into human identification and injury analysis. However, tasks of expert in forensic dentistry have

broadened in recent years to cover issues related to child abuse and domestic violence, human rights protection and professional ethics.

Why Teeth?

Every human body ages in a similar manner, the teeth also follow a specific pattern. These quantitative measurements help to establish relative age of a person. Dental X-ray is an example (**Figure 1**).



Figure 1 Dental X-ray for age estimation

Each human has an individual set of teeth which can be traced back to establish dental records to find missing individuals.

A tooth is made of enamel, hardest tissue of the body, so it can withstand trauma, decomposition, heat degradation, water

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immersion and desiccation better than other tissues in body. Teeth are a source of DNA; dental pulp or a crushed tooth can provide nuclear or mitochondrial DNA that help to identify a person.

Human Identification

Identification is based on comparison between known antemortem characteristics of a missing individual with recovered postmortem data from an unknown body. The records of different ante mortem dental works like bridging, fillings, etc. as shown in **Figure 2**; are compared with the post mortem dental findings for identification.



Figure 2 Different dental works like bridging, fillings, etc

Identification of the deceased is most commonly achieved visually by a relative or a friend who knew the person during life. This is performed by looking at characteristics of the face, various body features and or personal belongings. However, this method becomes undesirable and unreliable when the body features are lost due to post and perimortem changes. Visual identification in those circumstances is subject to error. Methods of human identification that are acknowledged as scientific are fingerprints, DNA, dental and medical characteristics.² Those methods vary in complexity, but share similar level of certainty. The dental characteristics are unique in being the easiest and quickest method of identification.

The diversity of dental characteristics is wide, making each dentition unique.³ The dental enamel is the hardest tissue in the body, and would thus withstand peri and post-mortem damages, and so would dental materials adjoined to teeth. Being diverse and resistant to environmental challenges, teeth are considered excellent post-mortem material for identification with enough concordant points to make a meaningful comparison. For dental identification to be successful, antemortem data need to be available.

This relies heavily on dental professionals recording and keeping dental notes, radio-graphs, study models, clinical photographs..., etc. The availability of dental records will allow comparing the dental characteristics of the person during life with those retrieved at autopsy with concordant points for positive identity as shown in **Figure 3**.



Figure 3 A- Ante mortem radiograph, B- Post-mortem radiograph

In cases where dental records are not available, expert in forensic dentistry can still contribute to establishing the identity by creating a profile of how the deceased person was during life. This includes any unusual oral habits, type of diet, socio-economic status, but most importantly the age of the person at time of death.

Forensic age estimation in living subjects has gained increasing significance in recent years. In dental age estimation, tooth eruption is a parameter of developmental morphology that can be analyzed by either clinical examination or by evaluation of dental X-rays.⁴ Dental aging is based on the chronology of formation and eruption of teeth. This helps in determining the age for persons up to 15 years in a fairly accurate manner. After 15 years of age, dental aging relies on modifications that take place during life, such as attrition, cementum formation and root transparency. Despite being extensively studied, results of aging of this latter group remain less than optimal because those age-related modifications can be influenced by various factors, such as diet and dental pathosis.⁵

The recovered skull (**Figure 4**) with mandible with fallen, broken, or deformed teeth can be of useful data for identification.



Figure 4 Recovered skull with fallen teeth

Forensic Dentistry in Mass Disaster

Routine identification tasks are a simple one-to-one matching process. This is not accomplish able in case of disasters. Identification is a big challenge for the medical professionals besides other problems like management of injured one without hospital with impaired transportation, lack of communications, etc. The identification of deceased victims in those circumstances necessitates putting a complete list of data consisting of an antemortem and details of postmortem dental information.

Forensic Odontologist has contributed to the solution of many mass disasters. The 2004 Indian Ocean tsunami is probably the most eminent example on the success of forensic odontologists in identifying large number of victims in the short-run. Nearly half of the victims in Thailand were identified by dental characteristics method alone, and forensic odontologists contributed to the identification of the remaining half by assisting the fingerprint, DNA and physical characteristics teams.⁴

Weak and even absence of dental records did not stop Forensic Odontologists from contributing to the identification of tsunami victims in Thailand. Victims with no dental records were either identified by photographic superimposition, if a photograph showing upper anterior teeth was provided², or by narrowing down possible matches for the DNA and fingerprint teams through dental aging.

Bite Mark Analysis

Bite marks are compared to known teeth molds to find origin of bite injuries. Few of the bite marks are shown in **Figure 5** and **Figure 6** to show how the criminal go away leaving behind trace evidences, patterns of their teeth, etc. with the victim or scene of crime.



Figure 5 Bite mark over cheek

Injuries induced by teeth and left on objects, such as skin, have a distinctive pattern. Those patterned injuries (bite marks) are useful to judicial authorities because they help in reconstructing past events that surrounded the biting process. For example, bite marks indicate a violent interaction between the perpetrator and the victim, and they might tell us something about the criminal intentions of the perpetrator, whether sexual, child abuse, or other forms of assaults. Moreover, bite marks are the only patterned injuries that can indicate (with different levels of certainty) who

the biter was. Forensic Odontologists can exclude or include persons suspected of causing the bite marks by comparing the locations and measurements of teeth marks in a bite mark with those of the suspect (s).⁶



Figure 6 Bite mark on palmer aspect of hand

However, several erroneous bite mark analysis, mainly from the United States courts, rendered this type of evidence questionable.⁸ The validity of bite mark analysis has undergone decent review in the last ten years aiming at boosting the scientific weight and improving the technique in a manner that can be reproducible. New research is under way to allow digital comparison of teeth and bite marks at a 3-dimensional level.⁹ This noble technique is aimed to overcome perspective distortion, a significant morbid factor in bite mark analysis that results from reducing 3-dimensional objects to 2-dimensional images.

Child Abuse: Social and Medico Legal Issues

The World Health Organization has declared that violence is a major and growing public health problem across the world.¹⁰ This landmark declaration meant that healthcare providers are involved in detecting and managing cases of violence, including abuse to vulnerable populations, i.e. children, elderly and women. The World Health Organization further distinguishes four types of violence; physical, sexual, psychological and neglect. All forms of violence can manifest in the oro-facial region, and hence should be of concern to dentists. Prevalence of physical violence, as a cause of maxillofacial injuries, ranges from 3.3% to 41% in various countries.¹¹ This wide range is probably due to different reporting thresholds in different communities. The true prevalence of violence is thus difficult to establish because of not or under reporting this problem.

Child maltreatment is defined as intentional harm or threat of harm to a child by a person acting in the role of caretaker.¹² Healthcare providers who care for children have a professional, and often legal, obligation to identify and protect children who may be victims of abuse and neglect. Injuries due to abuse can manifest in the oro-facial region in various forms, including fractured anterior teeth, fractured alveolar bone, lacerations of the labial and buccal mucosa, lacerations to the frenum and bruises to the lips, face and neck. Therefore, injuries to the oro-

facial region should raise reasonable suspicion to the treating dentist.

In various countries there are laws that govern reporting of violence. Some laws penalize healthcare workers by imprisonment, and or fines, for not reporting violence manifested on their patients.^{13, 14} All 50 states in the United States (US) and some countries around the world (including Argentina, Finland, Israel, the Republic of Korea, and Spain) have enacted legislation that mandates reporting of suspected child abuse.¹⁵ In other countries (such as Croatia, Japan, the Netherlands, and Romania), reporting is voluntary.

Avoiding the diagnosis of abuse because of lack of knowledge or phobia of the legal system is hazardous to the health and well-being of children. The offense of child abuse is highly grave in nature and leaves the child in a state of mental turmoil and physical torture. The parliament of India has been long awaited to make the law against child abuse even stricter since the present law and order has many loopholes and thus the criminal gets discharged at a minimal punishment.

Medico legal experts are invariably at the front in detecting signs of violence appearing on their patients, i.e. the bite marks as shown in **Figure 7** besides others. They should be aware that patient has a right to be treated with a reasonable degree of care, skill and knowledge. A mistake by a medical practitioner, which no reasonably competent and careful practitioner would have committed, is nothing short of negligence. But the law recognizes the danger that is inherent in surgical operation, where the operation is a race against time; the court will make greater allowance taking into account the 'risk-benefit' test.



Figure 7 Love bite or hickey

CONCLUSION

If the human race is to survive and progress, preservation of law is a must. Dental practitioners should be aware of the forensic application of dentistry. Dental records that are shown to provide patients with optimal dental service could also be very beneficial to legal authorities during an identification process. Medical practitioners do not enjoy any immunity from an action in tort, and they can be sued on the ground that they have failed to exercise reasonable skill and care either in reporting the authority

about their patient of medico-legal importance or in treatment or in keeping the records properly.

REFERENCES

- Bernstein M. Forensic Odontology. Eckert WG. Editor. Introduction to Forensic Sciences. 2nd ed. Boca Raton, FL: CRS Press; 1997. p. 304-51.
- INTERPOL. Disaster Victim Identification. 1994 [cited 2009 Feb 5]; Available from: URL: <http://www.interpol.int/public/disastervictim/default.asp>
- Adams BJ. Establishing personal identification based on specific patterns of missing, filled, and unrestored teeth. J Forensic Sci 2003 May;48(3):487-96.
- Olze A, Peschke C, Schulz R, Schmeling A. Studies of the chronological course of wisdom tooth eruption in a German population. J Forensic and Legal Med 2008 Oct;15(7):426-429.
- Meinl A, Huber CD, Tangl S, Gruber GM, Teschler-Nicola M, Watzek G. Comparison of the validity of three dental methods for the estimation of age at death. Forensic Sci Int 2008 Jul 4;178(2-3):96-105.
- Hani Al-Amad Suhail Dr. Forensic Odontology. Smile Dental Journal 2009;4(1):22-24.
- Al-Amad S, McCullough M, Graham J, Clement J, Hill A. Craniofacial identification by computer-mediated superimposition. J Forensic Odontostomatol 2006 Dec;24(2):47-52.
- Bowers CM. Problem-based analysis of bite mark misidentifications: the role of DNA. Forensic Sci Int 2006 May 15;159 Suppl 1:S104-9.
- Blackwell SA, Taylor RV, Gordon I, Ogleby CL, Tanijiri T, Yoshino M, et al. 3-D imaging and quantitative comparison of human dentitions and simulated bite marks. Int J Legal Med 2007 Jan;121(1):9-17.
- World Health Organization. Prevention of violence: a public health problem. 49th World Health Assembly Resolution WHA49.25: Geneva: WHO, 1996.
- Eggensperger N, Smolka K, Scheidegger B, Zimmermann H, Iizuka TA. 3-year survey of assault-related maxillofacial fractures in central Switzerland. J Craniomaxillofac Surg. 2007 Apr;35(3):161-7.
- Wissow, LS. Reporting suspected child maltreatment. Child Advocacy for the Clinician: An Approach to Child Abuse and Neglect. Wissow, LS (Ed), Williams and Wilkins, Baltimore 1990. p.209.
- Government of Dubai. Article 273 Federal Penalties Law of the UAE. 1987 Nov 3. [cited 2009 Feb 5]; Available from: URL: <http://www.dc.gov.ae>
- Jordanian Legislations. Article 207 Penalties Law of Hashemite Kingdom of Jordan. 1960. [cited 2009 Feb 5]; Available from: URL: <http://www.lob.gov.jo>
- Krug, EG, et al (Eds). World report on violence and health. World Health Organization, Geneva 2002.

REVIEW PAPER

Antibacterial Property of few Plants used as Chewing Stick

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ABSTRACT

Healthy environment of the oral cavity reflects the health of the oral tissues and teeth. Good oral health and healthy teeth results in overall health and well being of our body. Apart from the impact on nutritional status, poor oral health can adversely affect speech and self-esteem and may lead to different oral diseases.

The use of herbs and plants for cleaning teeth and treating different oral diseases has been practiced in India since time immemorial. Different population of India uses the traditional toothbrush or chewing stick, known as datun. Pencil-sized sticks are fashioned from certain plant-parts and end parts of the plants are chewed until it looks like a brush. The brush-end is used to clean teeth in similar way like the use of a toothbrush. Studies done on different parts of plants reported to have antibacterial property. Most of the oral diseases are due to bacterial infections and it has been well documented that medicinal plants possess significant antibacterial activity against various microorganisms. This paper reviewed the finding relating to the studies of few commonly used plants.

Keywords: Antibacterial, Extract, Chewing stick

INTRODUCTION

The knowledge of the consequences of maintaining oral hygiene is not new for Indians. The great physician and surgeon Sushruta, who lived in the 6th century, described the use of dental fiber pencil by the Indians. The Hindu Vedas contain description of oral hygiene procedures, where twice a day mouth cleaning was suggested. Twigs of various aromatic shrubs are used for cleaning teeth. Traditionally various ayurvedic preparations were also made specifically for dental application to get relief from oral diseases.¹

It has been observed that sticks used for cleaning teeth helps to inhibit the growth of certain oral pathogens associated with development of dental caries, gingival and periodontal diseases.² Natural products have been in use for thousands of years in folk

medicine for several purposes and are now recognised universally as basis for number of critical human health, social, and financial benefits. According to World Health Organisation 70% of Indian population, rely on traditional medicine.³ There are approximately 1,250 Indian plants used for medicinal purpose. Researchers reported that natural photochemical could offer an alternative natural remedy by replacing antibiotics and represents a promising approach in prevention and cure for dental caries and other oral infections.⁴

Few plants used as chewing stick are: Azadirachta Indica (Neem): The taxonomic hierarchy of it is mentioned in **Table 1**.

Table 1 Taxonomic Hierarchy of Azadirachta indica

Kingdom	Plantae	Plants, planta, vegetal, plants	
Subkingdom	Viridiplantae	Infrakingdom	Streptophyta-land plants
Superdivision	Embryophyta	Division	Tracheophyta--Vascularplants, tracheophytes
Subdivision-	Spermatophytina	Spermatophytes- seed plants, phaneogames	
Class	Mongoliopsida,	Superorder- Rosanae	Order- Sapindales
Family	Maliaceae- Mahogany		Genus- Azadirachta A Juss
Species	- Azadirachta indica A Juss-neem		

Neem grows well in tropical and sub-tropical regions. It is found in India, Bangladesh, Thailand, Nepal and Pakistan. Neem is known as 'arista'. The Sanskrit- meaning of arista is perfect, complete and imperishable.

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Fruit, seeds, oil, leaves, roots, bark and almost every part of the neem tree is bitter and contain compounds with proven antiseptic, antiviral, antipyretic anti-inflammatory, anti-ulcer and antibacterial, antifungal, anti plasmodial, and anti diabetic properties.⁵ The use of neem twigs as tooth brush is an age old method practiced by Indian population. *Neem* contains the alkaloid margosine, resins, gum, chloride, fluoride, silica, sulfur, oils, tannins, saponins, flavenoids, sterols and calcium.⁶ Presence of fluoride in *neem* stick is known to exert an anti-cariogenic action. Silica acts as an abrasive and prevents plaque accumulation. Alkaloids are considered to exert an analgesic action, which also contributes towards oral health. The oils have carminative, antiseptic, and analgesic effects.⁷

Neem mouthwash is observed to inhibit the growth of *S. mutans*. Tannins exert an astringent effect and form a coating over the enamel, thus protecting tooth decay.⁸ Flavenoids have an anti-cariogenic property, which is also present in tea. Wolinsky *et al.*, reported that pretreatment of saliva-conditioned hydroxyapatite with neem-stick extract prior to exposure to bacteria, yielded significant reduction in bacterial adhesion.⁹ Prashant *et al.*, undertook an *in-vitro* study of the effect of mango and neem extract on four micro organisms causing dental caries, *Streptococcus mutans*, *Streptococcus salivarius*, *Streptococcus mitis*, and *Streptococcus sanguis* and emphasized the fact that neem extract produced the maximum zone of inhibition on *Streptococcus mutans* at 50% concentration. In 5% concentration also, neem extract showed some inhibition against all the four species of organisms.¹⁰

Mangifera Indica L (Mango tree): The Taxonomic Hierarchy is mentioned in **Table 2**.

Table 2 Taxonomic Hierarchy of Mangifera Indica L

Kingdom	Plantae – Plants	Subkingdom	Tracheobionta – Vascular plants
Superdivision	Spermatophyta- Seed plants	Division	Magnoliophyta –Flowering plants
Class	Magnoliopsida- Dicotyledons	Subclass - Rosidae	
Order	Sapindales	Family	Anacardiaceae – Sumac family
Genus	<i>Mangifera</i> L. – mango	Species	<i>Mangifera indica</i> L. – mango

Mango tree is found mainly in South Asia and are found in nature as wild mangoes. It may produce fruits for 40 years or more. Mango trees are deep-root evergreen trees that achieve the height of 90 feet and width of 80 feet.

Mango seed kernels contain considerable quantity of phenolic compounds, lipid, unsaponifiable matter and a small quantity of crude protein, but the quality of protein was good because it's rich essential amino acids content with maximum values of leucine, valine and lysine. Eight phenolic compounds were identified within mango seed with tannin and vanillin in highest amount. Stearic acid is the main saturated fatty acid while oleic acid is unsaturated fatty acid. It is a good source of polyphenols.¹¹

Mirghani *et al.*, reported from their study that mango seed kernel showed good antibacterial activity against four strains of gram positive and gram negative bacteria.¹² Prakash *et al.*, reported that antibacterial effect of two variety of mango seed kernel extract against several bacteria has been recognised and considered as one of the most important property associated with their probable biological applications.¹³ *In vitro* antibacterial activities of ethanol

and methanol extracts of mango bulb showed inhibitions to tested organisms with variable inhibition zones against *Mycobacterium smegmatis*, *Candida albicans* and *Aspergillus niger*.¹⁴

Elongvan *et al.*, found aqueous extract of mango was effective against both *S. mutans* and *L. acidophilus* at high (50%) concentrations.¹⁵

Camellia Sinensis L. (Tea tree):

Table 3 Taxonomic Hierarchy of Camellia sinensis L

Kingdom	Plantae – plants, planta, vegetal, plants	Subkingdom-Viridiplantae
Infrakingdom-	Streptophyta- land plants	Superdivision-Embryophyta
Division-	Tracheophyta-vascular plants	tracheophytes
Subdivision-	Spermatophytina,	
Class-	Mangoliopsida Superorder-Asteranae,	Order-Ericales
Family-	Theaceae – tea	Genus-Camellia L. – tea
Species	Camellia sinensis (L.) Kuntze – tea	

Tea is cultivated worldwide and of the total amount of tea produced and consumed, 78% is black, 20% is green, and 2% is oolong tea. Black tea is popular in western and in south Asian countries such as Sri Lanka and India, while green and oolong teas are used in East Asian countries such as China, Japan, and Taiwan. Assam is the world's largest tea-growing region. Though Assam generally denotes the black teas, the region also produces small quantities of green and white teas as well with their own distinctive characteristics. It contains small amount of xanthine, tannin, flavenoids, quercetin, kaempferol and saponin.¹⁶

In several animal experiments green tea and black tea have been shown to decrease plaque score and caries index. Antibacterial activity of tea polyphenol decreases, when the extent of tea fermentation is long, implying stronger activity in green tea than black tea.¹⁷ Green tea catechins, particularly epigallocatechin gallate EGCG and epicatechin gallate (ECG), have antibacterial activity against both Gram-positive and Gram-negative bacteria.¹⁸ Catechins and theaflavins, polyphenolic compounds derived from tea have been reported to prevent tooth decay and oral cancer.¹⁹ Extracts of tea have shown significant bactericidal activity against methicillin resistant *Staphylococcus aureus* (MRSA) concentrations available in ordinarily brewed tea.²⁰

Vitex Nigundi L (Posotia):

Table 4 Taxonomic Hierarchy of Vitex Nigundi L

Kingdom	Plantae – Plants	Subkingdom	Tracheobionta –vascular plants
Superdivision	Spermatophyta –Seed plants	Division	Magnoliophyta – Flowering plants
Class-	Magnoliopsida – dicotyledons	Subclass-Asteridae	Order-Lamiales
Family-	Verbenaceae – Verbena family		
Genus-	<i>Vitex</i> L. – chastetree		

Posotia (*Vitex negundo*) is an important medicinal plant widely distributed throughout India, Sind, Ceylon, Afghanistan, Philippine Islands and Tropical Africa, Madagascar and China. It is commonly known as five-leafed chaste tree or monk's pepper. It has many flowers with bluish purple colour. The fruit is rounded; when ripe it becomes black and juicy, and about 4 mm in diameter. The plant is bitter. It is used as astringent, antiseptic, anti-inflammatory, antipyretic etc. Though almost all of its parts are used in Ayurveda and Unani medicine, the extracts from its leaves and roots are the most important in the field of medicine and drug.

Phytochemical studies of *Vitex negundi* have afforded several types of compounds, such as volatile oils, terpenes (triterpenes, diterpenes, sesquiterpenes), lignans, flavonoids and steroids.²¹

Study of vitex nigundo extracts were evaluated for antibacterial potential against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Pseudomonas aeruginosa* strains by Khokra *et al.*²² Crude extract of hexane, chloroform and methanol of leaf and flower of vitex nigundi exhibited potential bactericidal properties.²³ Oral administration of vitex nigundi claimed to have anti-inflammatory, analgesic and antibacterial property. It is used as a mouthwash to treat periodontal disease and to get relieve from toothache. Srinivas *et al.*, found from their study that crude extract of hexane, chloroform and methanol of leaf and flower of vitex nigundi exhibited potential bactericidal properties.²³ Renuka *et al.*, observed that aqueous extract of *Vitex negundo* has more antibacterial property against *staphalococcus Aureus*, E coli and *Klebsilla pneumoniae* than the methanol and chloroform extract.²⁴ Nagarsekar *et al.*, concluded from their study that *Vitex negundo* has antimicrobial activity against gram positive microorganisms and suggests that it can be developed as indigenous antimicrobial agent.²⁵

Jatropha Curcas L (Bhotera):

Table 5 Taxonomic Hierarchies of *Jatropha Curcas L*

Kingdom	-Plantae – Plants	Subkingdom	Tracheobionta – vascular plants
Superdivision-	Spermatophyta – Seed plants	Division	-Magnoliophyta – Flowering plants
Class	Magnoliopsida – Dicotyledons	Subclass-	Rosidae
Order-	Euphorbiales		
Family-	Jatropha L – Nettlespurge		
Genus	Jatropha carcass L. – Barbados nut		

Jatropha grows in tropical and sub tropical regions. *Jatropha* is not sensitive to day length (flowering is independent of latitude) and may flower at any time of the year. It is a succulent deep-rooted shrub that sheds its leaves during the dry season, which make it well suited for semi-arid conditions.

Jatropha curcas leaves, which show antileukemic activity contain a-amyrin, campesterol, stigmasterol, beta sitosterol and its derivatives. Further, leaves contain rare C-Glucosyl-flavonoids like vitexin and isovitexin. Protein (mostly lectins), and oil, largely of oleic acid, linoleic acids, curcasin, arachidic, myristic, palmitic, and stearic acids are also reported.²⁶

In various study, it is reported that *J. curcas* contains rare natural component, like cyclic peptides, which are known to be strong antibacterial, anticancer and immunosuppressive drugs. The two major cyclopetides isolated from *J. curcas* latex consists of nine amino acids. The people of Africa, Asia and Latin America use it in medicinal folklore to cure various diseases. *Jatropha* have been popular to cure stomachache, toothache, swelling, inflammation, leprosy, dysentery, vertigo, anemia, diabetes, as well as to treat HIV, ringworm, ulcers, malaria, skin diseases, bronchitis, asthma and as an aphrodisiac.²⁷ Preparations of all parts of the plant are used in traditional medicine and veterinary purposes.⁵⁰ Methanol, ethanol and water extract of the plant showed varying degree of antibacterial activities against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Streptococcus faecalis*, *Klebsiella pneumoniae* etc.²⁹ The anti-inflammatory activity of paste form of *J. curcas* L. root powder is

confirmed through the investigation conducted on albino mice.³⁰

CONCLUSION

Worldwide twigs of many trees have been in use for teeth cleaning from long back. During cleaning anti-microbial constituents may get released in the oral cavity and protect teeth and its associated parts against oral microbes. Some of the constituents of these plants have already established and gained popularity because of its antibacterial properties against various organisms and fungi and many more are yet to be experimented and discovered.

REFERENCES

1. Sushrata. An English translation of Shuruta Samhita. Sutrasthanam. vol 1, Bhishgratna KK. Calcutta No 10 Kashi Ghose lane: Published by author; 1907.
2. Enwonwu CO. Socio-economic factors in dental caries prevalence and frequency in Nigerians. An epidemiological study. Caries Res 1974;8:155–71.
3. World Health Organization (WHO) National Policy on Traditional Medicine and Regulation of Herbal Medicines. Geneva: 2005. Report of WHO global survey.
4. Singh J, Kumar A, Budhiraja S, Hooda A. Ethnomedicine : Use in dental caries. Braz J Oral Sci 2007;6(21):1308-12.
5. Subapriya R, Nagini S, Medicinal properties of Neem leaves: A Review Source, Current Med Chem -Anti-Cancer Agents 2005;5(2):149-156.
6. Biswas K, Chattopadhyay I, Banerjee RK, Bandyopadhyay U. Biological activities and medicinal properties of neem (*Azadirachta indica*) Curr Science 2002;82:1336–1345.
7. Abhishek S, Sankhla B, Hongal SMS, Thanveer K, and Ajithkrishnan CG. Effect of Traditionally Used Neem and Babool Chewing Stick (Datu) on Streptococcus Mutans: An In-Vitro Study. J Clin Diagn Res 2014;8(7):ZC15–ZC17.
8. Khalid A, Taha RAL. The Natural Toothbrush. World health forum 1995;16:206-10.
9. Wolinsky LE, Mania S, Nachnani S, Ling S. The inhibiting effect of aqueous *Azadirachta indica* (Neem) extract upon bacterial properties influencing in vitro plaque formation. J Dent Res 1996;75:816–822.
10. Prashant GM, Chandu GN, Murulikrishna KS, Shafiulla MD. The effect of mango and neem extract on four organisms causing dental caries: Streptococcus mutans, Streptococcus salivarius, Streptococcus mitis, and Streptococcus sanguis: an in vitro study. Indian J Dent Res 2007;18:148–151.
11. Karunanithi B, Bogeshwaran K, Tripuraneni M, Reddy SK. Extraction of Mango Seed Oil From Mango Kernel. International J Eng Res Dev 2015;11(11):32-41.
12. Mirghani MES, Yosuf F, kabbashi NA, Vejjayan J, Yosuf ZBM. Antibacterial activity of Mango kernel extracts. J Appl Sci 2009;9(17):3013- 3019.
13. Prakash A, Keerthana V, Kumar JC, Kumar R Agrawal DC. Antibacterial Property of Two Different Varieties of Indian Mango (*Mangifera indica*) Kernel Extracts at Various Concentrations against some Human Pathogenic Bacterial strains. Int Res J Biological Sci 2013;2(4):28-32.

ORIGINAL PAPER

Practice of Antenatal Breast Expression in National Health Service in England

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ABSTRACT

Purpose: Antenatal breast expression (ABE) is widely used in National Health Services (NHS) in England without any evidence of its safety and efficacy. The purpose of this study was to investigate the extent of its use by professionals in NHS settings in England. **Methods:** An online questionnaire was sent to healthcare professionals involved in providing care to pregnant women in maternity units in England. **Results:** 56 maternity units in England with delivery rates varying from 1600 to 11,000 per annum responded to the survey including 75% response from the large hospitals. Most hospitals are offering ABE at 36-37 weeks with an aim to reduce hypoglycaemia and neonatal admissions to special care in diabetic antenatal women. **Conclusion:** Despite of no proven evidence of safety and efficacy, ABE is practiced in many trusts, which have huge cost and time implications, hence a clear need of evidence and guidance.

Keywords: Antenatal Breast Expression, Diabetes, Pregnancy, Hypoglycaemia, Special Care Admission

Key Notes: This paper reviews the extent of the practice of antenatal breast feeding particularly in diabetic women in the national health system in England, whilst its safety and efficacy is yet to be proven.

INTRODUCTION

Antenatal Breast Expression (ABE) expresses colostrum in antenatal period either by hands or sometimes using breast pumps. This was first documented during the mid 20th century where it was described as a rationale to increase the milk flow and lactation postnatally.^{1,2} ABE has also been described as potential benefits in reducing breast feeding problems postnatally,³ its effect on ripening the cervix and labour augmentation.⁴ More recently, ABE was tested for its feasibility of expression, storage and provision of stored colostrum in diabetic pregnant women for the infants if they became hypoglycemic at birth.⁵

Currently the practice of ABE is widespread and worldwide and subjectively seems that many hospitals in England advocate for this practice and is most commonly advised in high-risk pregnancies such as diabetes. Poorly controlled pre-existing diabetes (type 1 or 2) can complicate pregnancy by 3-6 times with increased incidences of major fetal congenital abnormalities and spontaneous miscarriages.⁶ A Confidential Enquiry into Maternal and Child Health reported of a 5 times likely risk of still born babies and are 3 times likely to die in their first month of life in diabetic mothers.⁷ Many units in England run a dedicated combined Medical-Obstetrics antenatal clinic for diabetic women including multidisciplinary team of obstetricians, and diabetic specialist team. The aim is to optimise the diabetic control and achieve a safer pregnancy and neonatal outcome. Given the complexity of this metabolic and vascular condition, there are increased risks of intervention to the pregnancy in diabetic women, which may result in an increased risk of induction of labour, instrumental delivery and emergency caesarean sections. Neonates of diabetic women are at an increased risk of hypoglycaemia secondary to hyperinsulinaemia and may require early and frequent feeding to avoid hypoglycaemia. With increased interventional deliveries, there may be delayed opportunities of early skin-to-skin contact and breast-feeding initiation. It is a perceived notion that often these infants are given glucose or formula milk and admitted to special care baby unit (SCBU) to maintain normoglycemia. To reduce the incidence of neonatal hypoglycaemia and admission to intensive/special care, an increasing number of maternity units in England practice antenatal breast expression in diabetic women. The expectation is that antenatal expression and the stored

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colostrums may then be used for these infants whereby the mother is unable to provide early feeding, therefore preventing the potential hypoglycaemia and the admission to SCBU.

Breast feeding rates in England are much lower compared to other European countries. UNICEF demonstrated in an infant feeding survey by baby friendly initiative in 2012 that only 17% mothers across England breastfed exclusively at 3 months and only 1% at 6 months. The Confidential Enquiry into Maternal and Child Health highlighted the importance of baby friendly initiative practice especially in diabetic mothers and recommended skin-to-skin contact and breastfeeding within one hour of birth.⁷ The benefits of metabolic control of breast feeding were particularly emphasised in diabetic mothers.⁷ Furthermore lactogenesis is delayed in diabetic mothers by at least 24 hours as compared to the non-diabetic women.⁸ ABE may be considered as a factor to increase the chances of breast feeding in such women, as women perceive already “primed” for breast feeding. Moreover, there is a subjective feeling that those women who choose to do ABE, will be more motivated and are more likely to continue to breastfeed longer postnatally. National Institute for Health and Care Excellence (NICE) guidelines suggest that there is a need for randomised controlled trials (RCT) to determine the clinical and cost effectiveness of ABE in diabetic women.⁹

Recent Cochrane review article¹⁰ stated, “*There are no published or unpublished randomised controlled trials comparing antenatal expressing with not expressing. There is no high level evidence about the potential benefits and harms of the expression and storage of breast milk during pregnancy by women with diabetes*”.

Although it seems that the practice of ABE is performed at many units in England, however the exact number of these units is not known. The key purpose of this survey was to identify the preponderance of this practice across units in England.

METHODS

This was a prospective online survey sent to all healthcare professionals providing care to pregnant women including diabetes specialist midwives, breast feeding midwives or other professionals involved with breast feeding and diabetes. A descriptive analysis of the data received was performed.

RESULTS

In total 56 units responded. Majority of the respondents were midwives (85%). Remainders were infant feeding specialists (11%), diabetic nurses (2%) and obstetricians (2%) (**Figure 1**).

The number of deliveries from the respondent trusts varied from 1600 to 11,000 deliveries per annum (**Figure 2**).

Of the 56 responses, 41 (73%) were from district general hospitals (DGH) and the remaining 15 (27%) were from tertiary hospitals. Amongst these DGH, 14 (25%) were from smaller DGH and 27 (48%) were from a much larger DGH (**Figure 3**). A unit with the deliveries of “< 3000 per year was considered a smaller trust whilst a larger DGH delivered >3000 deliveries per year.

The response was received from various regions across England (**Figure 4**).

73% of the responding units offered ABE only to diabetic women

whilst 25% offered to all high risk women. 19% units offered ABE to all pregnant women. Majority of units (98%) would advise ABE at 36-37 weeks, and very few units (2%) will advise it at 35, 38 or 39 weeks.

Most units advocate ABE to their pregnant population to reduce the chances of fetal hypoglycemia (92%) and to reduce the incidence of neonatal admission (67%), while some viewed this to stimulate labour (8%). 33% units offered ABE to improve breast feeding rate. These units believed that ABE will provide the mother with the confidence and empowerment in relation to post natal breast feeding, and this will simultaneously help reduce the post natal supplement formula milk. Some units are doing ABE for more than one of the above reasons.

Interestingly most units have either not audited their practice of ABE, or not sure of an audit (89%). Only 11% units believe that they have audited their practice of ABE.

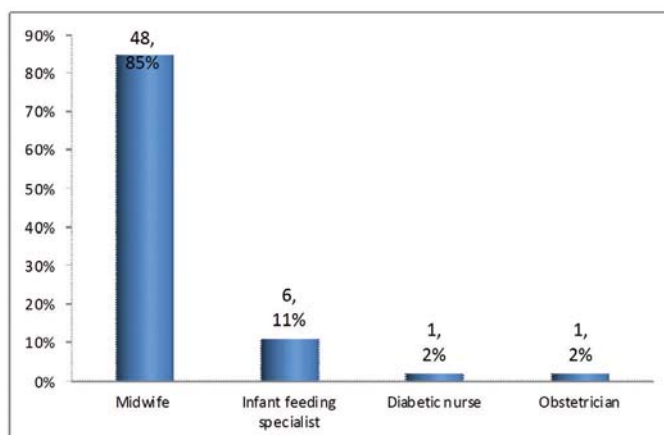


Figure 1 Respondents as per speciality role

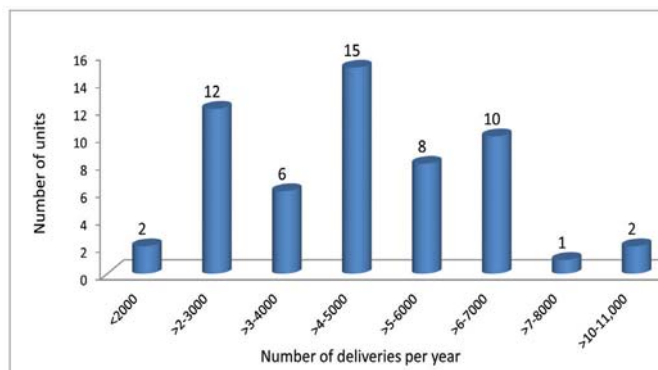


Figure 2 Number of units responded according to the delivery rate

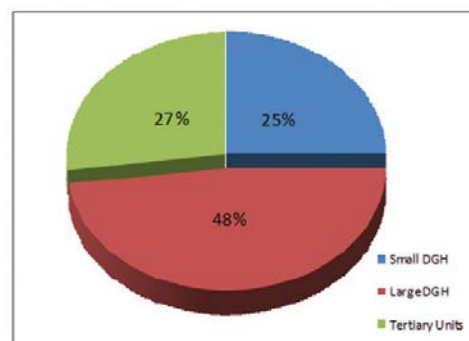


Figure 3 Response according to the size of unit

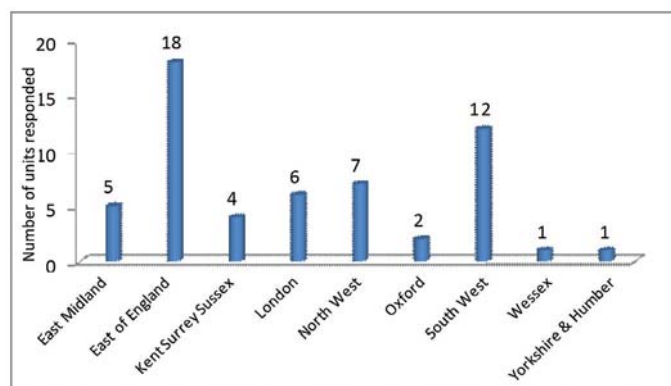


Figure 4 Response as per region in NHS

DISCUSSION

There has been no randomised controlled trial (RCT) worldwide till date reviewing the safety and efficacy of ABE and yet this is a widely used practice in the NHS costing hugely without any evidence. Diabetic women in general are considered to be a high risk population for higher perinatal morbidity and mortality rate and there is also an increased risk of neonatal admission specially with fetal hypoglycaemia if these babies are not fed within 1 hour of delivery. It is a perceived notion that by using stored colostrums, the incidence of neonatal admission due to the fetal hypoglycaemia can be reduced. However, a small retrospective cohort study¹¹ (Soltani and Scott, 2012) showed the trend of a higher rate of special care baby unit admission for babies from the breast milk expression group as compared to those who did not express antenatally. Although this was a small retrospective study and the number of admission to SCBU were not statistically significant, however, obtaining the result contrary to belief is concerning about this practice. Local data from author's hospital (unpublished) also revealed that there was no statistically significant reduction in overall admission rate to SCBU as well as the neonatal hypoglycaemia was not reduced in the women where neonates used expressed colostrum.

An appropriately powered RCT is needed to determine the safety of this practice and its acceptability to women and health professionals before it can be recommended for implementation in practice. The research on ABE needs to ascertain the proportion of women with diabetes undertaking ABE, the percentage of those that succeed in expressing and storing milk, and finally the proportion of neonates that are fed antenatally expressed milk. If ABE is proven to be safe and effective for the mother and the baby, this practice can then be instigated in a wider practice in NHS with evidence, however if this practice is proven unsafe and/or not effective, women can be counselled appropriately and expenses and resources can thus be avoided in several NHS maternity providers. This survey indicated that 75% of the units, which were either large DGH or tertiary centres, currently employ this practice, which has huge cost implications. Each unit in the NHS encounters approximately 10-12% of the antenatal women with diabetes suggesting a significant number of antenatal women being counselled and advised for ABE, which equates to a significant involvement of the NHS resources.

LIMITATION OF THE STUDY

This study is not providing a representative cross section of the professionals and therefore has its limitations, as majority of responders were midwives.

STRENGTH OF THE STUDY

Although only 56 units responded, this result can be extrapolated as a fair representation of the maternity units across the England as the responses were received from 9 regions across England. 75% of the responses received were from large DGH and tertiary units. The units with delivery rates up to 11,000 per annum also responded to this survey.

CONCLUSION

This survey provides an overview of the use of ABE practice in the NHS setting in England. There is no evidence of safety and efficacy of ABE so far and yet it is practiced in many units across England without any appropriate audit of this practice. This may however have a huge time and cost implications in an already constraint financial situation in the NHS.

Acknowledgements: All professionals and units responded to the survey.

Conflict of Interest: None

Ethics Approval: Local R&D approval was sought. As this survey did not involve any patients, no further approval was required.

Author declaration: "I declare that this work was done by the author named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the author". The author SP conceived and designed the study, collected and analyzed the data.

REFERENCES

1. Waller, H. The early failure of breast feeding: A clinical study of its causes and their prevention. *Archives of Disease in Childhood* 1946;21(105):1-12.
2. Waller, H.. The early yield of human milk, and its relation to the security of lactation. *Lancet* 1950;53-56.
3. Chapman T, Pincombe J, Harris M. Antenatal breast expression: a critical review of the literature. *Midwifery* 2013;29(3):203-10.
4. Kavanagh J, Kelly AJ, Thomas J. Breast stimulation for cervical ripening and induction of labour. *Cochrane database of systematic reviews* 2005 issue 3.
5. Forster DA, McEgan K, Ford R, Moorhead A, Walker S, McNamara C. Diabetes and antenatal milk expressing: a pilot project to inform the development of a randomised controlled trial. *Midwifery* 2011;27:209-14.
6. Bell R, Glinianaia S, Tennant P, Bilous R, Rankin, J. Peri-conception hyperglycaemia and nephropathy are associated with risk of congenital anomaly in women with pre-existing diabetes: a population-based cohort study. *Diabetologia* 2012;55(4):936-947.
7. Confidential Enquiry into Maternal and Child Health. Diabetes in pregnancy: Are we providing the best care? Findings of a National Enquiry: England, Wales and Northern Ireland. London CEMACH, 2007.
8. Arthur P, Kent J, Hartmann. Metabolites of lactose synthesis in milk from diabetic and nondiabetic women during lactogenesis II. *J.Pediatr. Gastro-enterol Nutr* 1994;19:100-108.
9. NICE. Diabetes in pregnancy: Management of diabetes and its complications from pre-conception to the postnatal period. 2008.
10. East CE, Dolan WJ, Forster DA. Antenatal breast milk expression by women with diabetes for improving infant outcomes. *Cochrane Database Syst Rev*.2014.
11. Soltani, H. and Scott, A. Antenatal breast expression in women with diabetes: outcomes from a retrospective cohort study. *Int Breastfeed J* 2012;7-18.

ORIGINAL PAPER

A Study on Pineal Gland and Melatonin in relation to 'Severe Depressive Episode'

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ABSTRACT

The pineal gland or epiphysis cerebri is a small grey organ occupying a depression between the superior colliculi. The importance of the pineal gland lies in its function. The gland is a neuroendocrine gland and consists of parenchymal cells, called pinealocytes and neuroglial cells. The pinealocytes secrete a hormone called melatonin. Melatonin, 5-methoxy-N-acetyltryptamin, is a neurohormone of the brain produced by pineal gland. The precursor to melatonin is serotonin, a neurotransmitter that itself is derived from the amino acid tryptophan. On the other hand 'severe depressive episode' is one of the commonest problems encountered by the doctors in the tropical countries like India, Pakistan and Bangladesh. Two particularly notable features of depression is diminished nighttime release of melatonin and abnormal sensitivity to melatonin suppression. Variation of the blood melatonin level, in the patients suffering from "severe depressive episode" with the normal individuals was seen in two groups: group "A" & group "B". In group "A" (control) subjects were selected from the medical and non medical voluntaries working at Gauhati Medical College & Hospital. In the other group "B" (case) patients attending the Psychiatry 'Out Patient Department' of Gauhati Medical College & Hospital with "severe depressive episode" were taken. The data recorded was analysed statistically using Student's T-test. P value ≤ 0.05 is considered as statistically significant. Such a study may be useful in establishing a database which may be useful in treating the patients suffering from 'severe depressive episode'.

Keywords: Pineal gland, Melatonin, Depression

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INTRODUCTION

The pineal gland is innervated by a nerve called nervus conarii which consists of postganglionic sympathetic fibers arising from superior cervical ganglion.¹ Melatonin, 5-methoxy-N-acetyltryptamin, is a neurohormone of the brain produced by pineal gland. Within the pineal gland, serotonin is acetylated to yield melatonin.² The main environmental control of the pineal melatonin synthesis is light intensity. Light perceived by the retina reaches the supra chiasmatic nucleus (SCN) through the retinohypothalamic tract. The SCN innervates the pineal gland via the dorsomedial hypothalamic nucleus, the upper thoracic intermediolateral cell columns of the spinal cord and the superior cervical ganglia, resulting in the rhythmic secretion of melatonin.³ In humans, as in animals, the plasma melatonin level rises in darkness and falls during the day.⁴ This has led researchers and clinicians to try melatonin as an experimental treatment for depression, with gratifying results.⁵ Disruption of circadian rhythms produces amnesia by interfering with the circadian organization of memory processes.⁶ Melatonin, by correcting circadian rhythms should, theoretically, improve mental performance.⁷ Melatonin has also been shown to improve immunity and extend lifespan in some mammals.^{8,9} In 'severe depressive episode', the sufferer usually shows considerable distress or agitation, unless retardation is a marked feature. Loss of self-esteem or feelings of uselessness or guilt are likely to be prominent, and suicide is a distinct danger in particularly severe cases.¹⁰ Low nocturnal Melatonin has been proposed as a trait marker for major depressive disorders.¹¹ Melatonin has been suggested for the improvement of sleep patterns in patients with depression, although research is limited in this area.^{12,13,14,15}

OBJECTIVES

To ascertain the variation of the blood melatonin level, in patients suffering from 'severe depressive episode' with normal individuals.

MATERIALS AND METHODS

The study has been done at Gauhati Medical College & Hospital

involving the Departments of Anatomy, Psychiatry and Biochemistry.

Selection of subjects: Two groups were made by selecting subjects of 10 years and above.

Selection of control (group “A”): Subjects were selected from the medical and non medical employees working at Gauhati Medical College & Hospital who volunteered themselves for the study. Subjects were screened free from severe depressive episode. Then they were taken as subjects after elimination of ‘Severe Depressive Episode’.

Selection of cases (group “B”): Cases of ‘severe depressive episode’ are selected as per – The ICD-10 Classification of Mental and Behavioral Disorders, clinical descriptions and diagnostic guidelines, World Health Organization, Geneva, 2002.

Time for collection of sample: To minimize the diurnal variation of melatonin in circulation, samples were collected between 10.00 am to 2.00 pm.

Estimation of blood melatonin level: Estimation of the melatonin was carried by ELISA method using the reagent kit “Melatonin ELISA-RE54021” manufactured and marketed by IBL (Immunobiological Laboratories) D-22335 HAMBURG, GERMANY in the department of Biochemistry, Gauhati Medical College.

Statistical analysis: The data recorded were analysed statistically using Student’s T-test. P value ≤ 0.05 is considered as statistically significant.

OBSERVATION & RESULTS

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Number of subjects in different age group

Age groups of control	Number of cases	Number of controls
10 to 19 years	0	6
20 to 29 years	8	19
30 to 39 years	11	15
40 to 49 years	8	5
50 years & above	3	5
Total number(n)	30	50

Table 2 Number of normal subjects in 20 to 29 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	27	M	8.38
2	28	F	8.38
3	29	F	8.01
4	29	M	10.21
5	28	M	8.34
6	29	M	6.70
7	25	M	5.63
8	28	M	6.20
Mean			7.73
S.D			± 1.476
S.E.M.			± 0.521

In this group consisting of 8 normal subjects between the age group of 20 to 29 years the serum melatonin level ranges from 5.63 to 10.21 pg/ml with a mean value of 7.73, Standard Deviation ± 1.476 and Standard Error of Mean ± 0.521 .

Table 3 Number of normal subjects in 30 to 39 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	35	M	6.90
2	38	F	8.33
3	38	M	4.60
4	30	M	4.94
5	37	M	8.36
6	35	F	8.37
7	39	M	8.40
8	34	M	8.34
9	37	M	8.07
10	33	M	5.44
11	37	M	4.62
Mean			6.94
S.D.			± 1.687
S.E.M			± 0.508

In this group consisting of 11 normal subjects between the age group of 30 to 39 years the serum melatonin level ranges from 4.60 to 8.40 pg/ml with a mean value of 6.94, Standard Deviation ± 1.687 and Standard Error of Mean ± 0.508

Table 4 Number of normal subjects in 40 to 49 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	40	M	4.93
2	47	M	5.43
3	42	M	5.42
4	40	M	5.65
5	42	M	6.50
6	46	M	6.40
7	45	M	8.02
8	40	M	4.92
Mean			5.91
S.D.			± 1.036
S.E.M			± 0.366

In this group consisting of 8 normal subjects between the age group of 40 to 49 years the serum melatonin level ranges from 4.92 to 8.02 pg/ml with a mean value of 5.91, Standard Deviation ± 1.036 and Standard Error of Mean ± 0.366

Table 5 Number of normal subjects in 50 years and above

Sl. No.	Age in years	Sex	Value in pg/ml
1	50	M	6.40
2	55	M	8.06
3	55	M	8.36
Mean			7.61
S.D.			± 1.055
S.E.M			± 0.609

In this group consisting of 3 normal subjects between the age group of 50 years and above the serum melatonin level ranges from 6.40 to 8.36 pg/ml with a mean value of 7.61, Standard Deviation ± 1.055 and Standard Error of Mean ± 0.609

Table 6 Number of cases in 10 to 19 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	19	F	9.60
2	15	F	281
3	18	F	9.58
4	17	F	6.80
5	18	M	9.62
6	18	M	286
Mean			100.43
S.D.			± 141.815
S.E.M			± 57.895

In this group consisting of 6 no of patients suffering from 'severe depressive episode' between the age group of 10 to 19 years the serum melatonin level ranges from 6.80 to 286 pg/ml with a mean value of 100.43, Standard Deviation ± 141.815 and Standard Error of Mean ± 57.895 .

Table 7 Number of cases in 20 to 29 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	20	M	285
2	27	M	4.86
3	26	M	6.58
4	25	M	8.09
5	28	F	4.87
6	25	M	5.04
7	23	F	6.83
8	25	F	284
9	22	F	5.02
10	21	M	9.57
11	27	F	280
12	24	M	267
13	21	F	6.84
14	25	M	4.88
15	21	F	8.05
16	22	F	280
17	29	M	8.06
18	22	F	7.46
19	25	M	7.48
Mean			78.40
S.D.			± 123.341
S.E.M			± 28.296

In this group consisting of 19 no of patients suffering from 'severe depressive episode' between the age group of 20 to 29 years the serum melatonin level ranges from 4.86 to 285 pg/ml with a mean value of 78.40, Standard Deviation ± 123.341 and Standard Error of Mean ± 28.296

Table 8 Number of cases in 30 to 39 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	30	M	264
2	36	F	416
3	30	M	281
4	32	M	266
5	33	F	268
6	38	M	5.06
7	36	M	8.08
8	35	F	265
9	31	F	6.56
10	32	F	280
11	38	F	272
12	32	F	6.57
13	31	M	10.48
14	37	M	266
15	30	M	7.52
Mean			174.82
S.D.			± 146.289
S.E.M			± 37.769

In this group consisting of 15 no of patients suffering from 'severe depressive episode' between the age group of 30 to 39 years the serum melatonin level ranges from 5.06 to 416 pg/ml with a mean value of 174.82, Standard Deviation ± 146.289 and Standard Error of Mean ± 37.769 .

Table 9 Number of cases in 40 to 49 years

Sl. No.	Age in years	Sex	Value in pg/ml
1	42	M	10.50
2	43	F	6.57
3	40	M	281
4	45	M	4.89
5	40	F	6.82
Mean			61.96
S.D.			± 122.466
S.E.M			± 54.768

In this group consisting of 5 no of patients suffering from 'severe depressive episode' between the age group of 40 to 49 years the serum melatonin level ranges from 4.89 to 281 pg/ml with a mean value of 61.96, Standard Deviation ± 122.466 and Standard Error of Mean ± 54.768 .

Table 10 Number of cases in 50 years & above

Sl. No.	Age in years	Sex	Value in pg/ml
1	53	M	7.51
2	73	F	5.00
3	65	F	268
4	62	M	10.46
5	52	M	10.52
Mean			60.30
S.D.			± 116.131
S.E.M			± 51.935

In this group consisting of 5 no of patients suffering from 'severe depressive episode' between the age group of 50 years and above the serum melatonin level ranges from 5.00 to 268 pg/ml with a mean value of 60.30, Standard Deviation ± 116.131 and Standard Error of Mean ± 51.935

The mean values of serum melatonin for both the groups are presented in **Table 2 to 10**. Mean values of serum melatonin for both groups are represented in **Figure 1**.

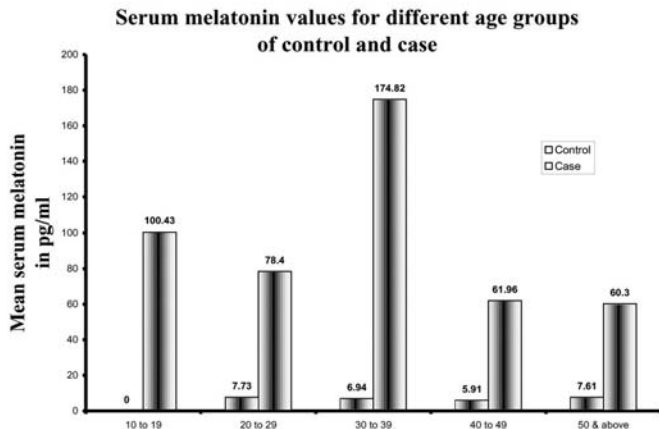


Table 11 Distribution of frequency, relative frequency and percentage of frequency

Class interval of melatonin in pg/ml	Normal			Patient		
	Simple frequency	Relative frequency	Percentage	Simple frequency	Relative frequency	Percentage
0 to 2	0	0.000	0.00	0	0.000	0.00
2 to 4	0	0.000	0.00	0	0.000	0.00
4 to 6	10	0.248	33.33	8	0.007	15.38
6 to 8	6	0.188	16.68	12	0.016	23.08
8 to 10	13	0.514	41.66	8	0.014	15.38
10 to 12	1	0.050	8.33	4	0.008	7.69
200 to 400	0	0.000	0.00	17	0.877	30.78
400 to 600	0	0.000	0.00	1	0.078	7.69
Above 600	0	0.000	0.00	0	0.000	0.00
n	30	1.000	100.00	50	1.000	100.00

Table 11 shows that for the normal group the highest number of subjects (maximum numbers of subject) in this group have total melatonin values in the class interval of 8 to 10 pg/ml with relative frequency of occurrence of 0.514. A secondary pick in serum melatonin value is present in the class interval of 4 to 6 pg/ml with a relative frequency of 0.248 as evident in **Figure 2**. In the patient group the distribution is more uniform and compact with highest relative frequency of occurrence 0.877 in the class interval of 200 to 400 pg/ml as evident in **Figure 2**.

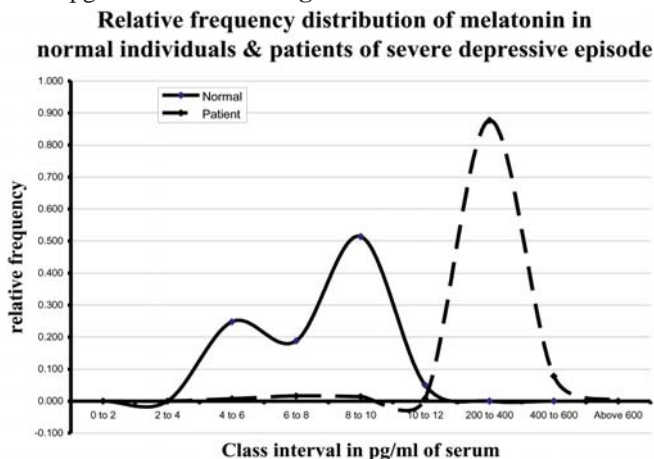


Figure 2 Distribution of 'Relative frequency'

Table 12 Showing values of melatonin for total number of control & cases

Sl. No.	Melatonin in pg/ml in normal	Melatonin in pg/ml In severe depression
1.	4.60	4.86
2.	4.62	4.87
3.	4.92	4.88
4.	4.93	4.89
5.	4.94	5.00
6.	5.42	5.02
7.	5.43	5.04
8.	5.44	5.06
9.	5.63	6.56
10.	5.65	6.57
11.	6.20	6.57
12.	6.40	6.58
13.	6.40	6.80
14.	6.50	6.82
15.	6.70	6.83
16.	6.90	6.84
17.	8.01	7.46
18.	8.02	7.48
19.	8.04	7.51
20.	8.06	7.52
21.	8.07	8.05
22.	8.33	8.06
23.	8.34	8.08
24.	8.34	8.09
25.	8.36	9.56
26.	8.36	9.58
27.	8.37	9.60
28.	8.38	9.62
29.	8.38	10.46
30.	10.21	10.48
31.		10.50
32.		10.52
33.		264.00
34.		265.00
35.		266.00
36.		266.00
37.		267.00
38.		268.00
39.		268.00
40.		272.00
41.		280.00
42.		280.00
43.		280.00
44.		281.00
45.		281.00
46.		281.00
47.		284.00
48.		285.00
49.		286.00
50.		416.00
Sum	207.95	5325.76
Mean	6.932	106.52
SD	± 1.525	± 135.0543
SEM	± 0.278	± 19.1

Table 13 Level of significance of differences

Sl. No.	Comparison of mean melatonin between	"t"	P
1	Patient of 30 to 39 years and 10 to 19 years	1.07	>0.05
2	Patient of 30 to 39 years and 20 to 29 years	1.04	>0.05
3	Patient of 30 to 39 years and 40 to 49 years	1.50	>0.05
4	Patient of 30 to 39 years and 50 years & above	1.27	>0.05
5	Control of 30 to 39 years and 20 to 29 years	0.07	>0.05
6	Control of 30 to 39 years and 40 to 49 years	0.09	>0.05
7	Control of 30 to 39 years and 50 years & above	0.02	>0.05

DISCUSSION

Considering the differential trends in melatonin secretion by pineal gland under the circadian rhythm and variations in exposure to darkness and light as reported by various workers on the allied subject,^{16,17} in the present investigation the samples for evaluation of pineal function through serum melatonin estimation has been collected between midday and afternoon which is extensively reported as the period of generalized depletion for circulating melatonin levels. Mean serum melatonin concentration in subjects with 'severe depressive episode' is found to be significantly high than the control group of normal subjects which may appear as contradicting with reports of related works on serum melatonin concentration under different conditions, situations and experimental setup.^{18,19} In most of these studies over serum melatonin concentrations with or without depressive episodes, the nocturnal serum melatonin status was reported which may be a factor for the discrepancy with the findings of the present study. However, with reference to the well established 'serotonin hypothesis'²⁰, it has been tried to explain here that in presence of conditions associated with 'severe depressive episode' if somehow the biosynthesis of melatonin is hampered then there will be increase in melatonin level even at day time without neuronal stimulus of darkness resulting in increase in day time basal melatonin in circulation as observed in the present study. One of the contrasting trends in serum melatonin level is in the distribution pattern between control and the group with 'severe depressive episode'. In the 'severe depressive episode' group the serum melatonin is found to be fluctuating under different age groups but in contrast to this there is no any fluctuation in the serum melatonin level in the control group.

CONCLUSION

In the control group 30 numbers of subjects were taken and in the 'severe depressive episode' group 50 number of subjects were taken. The mean serum melatonin in the control group is 6.932 ± 0.278 pg/ml and the mean serum melatonin in the group with 'severe depressive episode' is 106.52 ± 19.1 pg/ml which is significantly higher ($P < 0.05$) than the control. The highest mean serum melatonin level in 'severe depressive episode' was observed as 174.82 ± 37.769 pg/ml in the age group of 30 to 39 years but without any significant differences ($P > 0.05$) from the other age groups.

Finally, it may be concluded that day time serum melatonin level is significantly elevated in subjects with 'severe depressive episode' under the limitations of the presented setup.

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Conflicts of interest: None declared.

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Ethical clearance: Taken.

REFERENCES

1. Singh V. Textbook of Clinical Neuroanatomy. Elsevier. New Delhi. 2005;1:170.
2. Bowen R. Other endocrine tissues and hormones. Hypertexts for Biomedical Sciences. 2003;2(3):169.
3. Ying-Hui Wu & Dick F. Swaab. The human pineal gland and melatonin in aging and Alzheimer's disease. J. Pineal Res. The Netherlands. 2005;2(38):145-152.
4. Snell RS. Clinical Neuroanatomy. Lippincott Williams & Wilkins, West Camden Street, Baltimore. 2006;6:247.
5. Dean WMD, Morgenthaler J & Fowkes SW. The Melatonin Chapter. Smart Drugs II. Cognitive Enhancement Research Institute. Menlo Park. California. 94026 USA. 2000;2:178.
6. Sandy KR, Anninos PA & Tsagas N. Age-related disruption of circadian rhythms. possible relationship to memory impairment and implications for therapy with magnetic fields. Int J Neurosci (England). 1991;59(4):259-62.
7. Ovanesov KB. The effect of the acute and chronic administration of melatonin on the relearning of rats in a Y maze and their sensitivity to haloperidol. Farmakol Toksikol. 1990;53(2):15-17.
8. Regelson W & Pierpaoli W. Melatonin: a rediscovered antitumor hormone, Cancer Investigation. 1987;5:379-385.
9. Piccardi G. The Chemical Basis of Medical Climatology. Thomas. Springfield Illinois. 1962;2:146
10. Phillip W & Long MD. Chapter V. The ICD-10 Classification of Mental and Behavioural Disorders World Health Organization, Geneva. 2005;119-124.
11. Webb SM & Puig-Domingo M. Role of melatonin in health and disease. Clinical Endocrinology. UK. 1995;42:221-234.
12. DeVries MW & Peeters FP. Melatonin as a therapeutic agent in the treatment of sleep disturbance in depression. J Nerv. Ment. Dis. USA. 1997;185(3):201-202.
13. Dolber OT, Hirschmann S, & Grunhaus L. Melatonin for the treatment of sleep disturbances in major depressive disorder. Am.J Psychiatry. 1998;155(8):1119-1121
14. Dalton EJ, Rotondi D, Levitan RD, Kennedy SH & Brown GM. Use of slow-release melatonin in treatment-resistant depression. J Psychiatry Neurosci. USA. 2000;25(1):48-52.
15. Kripke DF, Youngstedt SD, Rex KM, Klauber MR & Elliott JA. Melatonin excretion with affect disorders over age 60. Psychiatry. USA. 2003;118(1):47-54.
16. Brownstein MJ & Heller A. Hydroxyindole -O- methyl transferase activity: effect of sympathetic nerve activity. Science. UK. 1968;162:365.
17. Law SP. The regulation of menstrual cycle and its relationship to the moon. Acta Obstetrica et Gynecologica Scandinavica. UK. 1986;65(1):45.
18. Thompson C, Franey C, Arendt J. & Checkley SA. A comparison of melatonin secretion in depressed patients and normal subjects. The British Journal of Psychiatry. 1988;152:260-265.
19. American Accreditation Health Care Commission. Melatonin, University of Maryland Medical Center (UMMC). University of Maryland Medical System. 22 S. Greene Street. Baltimore. 2008;2(1):43
20. Gibbons RD. & Davis JM. Consistent evidence for a biological subtype of depression characterized by low CSF monoamine levels. Acta Psychiatr Scand. 1986;74(1):8-12.

ORIGINAL PAPER

A Comparative study of APACHE II and SOFA Scoring Systems in Critically ill Patients with Sepsis

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ABSTRACT

There are several well recognized scoring systems for evaluation and prognostication of critically ill patients. While the APACHE II (Acute Physiology and Chronic Health Evaluation II) scoring system uses a point score based on physiologic parameters, age and previous health status, the SOFA (Sequential Organ Failure Assessment) scoring system takes into account the organ failure in critically ill patients. In the assessment of critically ill patients with suspected multi-organ dysfunction admitted in ICU, the role of SOFA in predictive validity for in-hospital mortality is being widely discussed. The present study is undertaken to prognosticate the patients by using two different established and defined scoring systems like SOFA and APACHE II, and to make attempt to establish early diagnosis of sepsis by using SOFA scoring in 50 critically ill patients with suspected multi-organ dysfunction admitted over a period of one year. The results showed that serial measurement of SOFA score during first week is a very useful tool in predicting the outcome especially on the day 3. The APACHE II score on day of admission, though reliable, was not very effective in predicting the mortality rate in our set up.

Keywords: APACHE II, SOFA, qSOFA, MODS, Sepsis, Septic shock

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INTRODUCTION

APACHE II (Acute Physiology and Chronic Health Evaluation II) is one of several ICU scoring systems applied within 24 hours of admission of a patient. It uses a point score based upon initial values of 12 routine physiologic measurements, age, and previous health status to provide a general measure of severity of disease.¹ The SOFA (Sequential Organ Failure Assessment) score is a simple, but effective method to describe organ dysfunction or failure in critically ill patients.²

Sepsis should be defined as life-threatening organ dysfunction caused by a deregulated host response to infection. For clinical assessment, organ dysfunction can be represented by an increase in the SOFA score of 2 points or more, which is associated with in-hospital mortality greater than 10%.

Septic shock should be defined as a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone. Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL) after adequate fluid resuscitation.³ This combination is associated with hospital mortality rates greater than 40%. Adult patients with suspected sepsis can be better identified to be more likely to have poor outcomes by using SOFA Score in comparison to APACHE II score.

A quick method of identifying patients at high risk for poor outcome with sepsis is by utilizing at least 2 of the following clinical criteria that together constitute a new bedside clinical score termed quick SOFA (qSOFA):⁴

- 1) Respiratory rate of 22/min or greater,
- 2) Altered mentation, or
- 3) Systolic blood pressure of 100 mm Hg or less.

As initiation of appropriate effective antimicrobial therapy is essential for a favorable outcome in the patient with sepsis, identification of the risk factors is also helpful in deciding about

the prognosis of the cases. Since the results of laboratory tests like culture & serology are available only after 24 to 48 hours, using scores like APACHE II and SOFA may help in predicting outcome in the crucial initial hours of management.

This study was conducted in patients admitted into the ICU of Emergency Medicine department to assess the comparative efficacy of APACHE II and SOFA scoring system in determining the early diagnosis of sepsis and prognosis of patients with sepsis.

MATERIALS AND METHODS

This prospective hospital based observational study was undertaken in the department of Emergency Medicine ICU of Gauhati Medical College & Hospital, over a period of one year from August 2014 to July 2015. Prior approval from Institutional Ethical Committee was obtained. A total of 87 critically ill patients were included in the study. The detailed history, clinical examination and all the relevant laboratory investigations were done. The clinical conditions were defined according to standard practice and based on relevant investigation reports. The patients of sepsis admitted to ICU of Emergency Medicine department were prognosticated on the basis of APACHE II score and SOFA score.

The objectives of the study were defined as:

1. To assess morbidity and mortality of patients with multi-organ dysfunction syndrome (MODS) in sepsis.
2. To prognosticate the patients by using two different established and defined scoring systems like SOFA and APACHE II.
3. To make attempt to establish early diagnosis of sepsis by using SOFA Scoring.

Various profiles between survivor group and non-survivor group were analyzed. Out of the 87 patients with sepsis admitted to the ICU, 50 patients with sepsis developed multi-organ dysfunction syndrome (MODS). The rest 37 patients did not qualify to be labeled as having multi-organ dysfunction syndrome, and hence these patients were not included in the final analysis of results in this study.

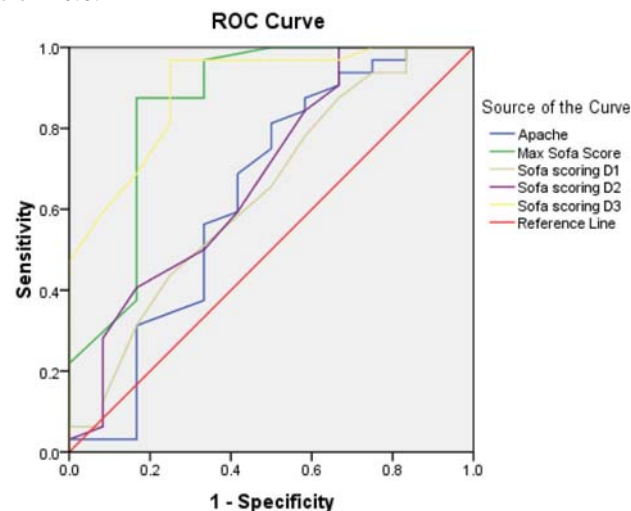
RESULTS

The clinical profile of 50 patients with sepsis with MODS was studied. There were 28 males and 22 females in this cohort. During the study period, 18 patients died and 32 patients survived with mortality rate of 36%. For all patients, APACHE II scoring was done on day of admission. Although reliable, it was not very effective in predicting the mortality rate in our patients. Though mean APACHE II score was high among non-survivors than survivors (23.28 v/s 18.75), APACHE II score was found to be of no statistical significance ($p=0.068+$).

For all patients, SOFA scoring was done from day 1 to the last day. The SOFA score on day 1 was high among non survivors and survivors which was statistically significant (10.17 v/s 7.94, $p=0.014$). However, the most significant difference was observed on day 3. The SOFA score was very high among non-survivors as compared to survivors which was statistically significant (13.42 v/s 6.84, $p<0.001$).

Receiver operating characteristic (ROC) curves were plotted to

define discriminative value of scores as a prognosis of mortality. Figure one shows the comparison of the SOFA score of the day one (D1), day two (D2), day three (D3), max SOFA score and APACHE II score was done using SPSS statistical software version 16.0.



Diagonal segments are produced by ties.

Figure 1 Comparison of APACHE II and SOFA scores by ROC curves

The “Areas under curves” (AUC) values observed are shown in **Table 1**.

Table 1 Showing AUC values of all scoring systems

Scoring system	Day	AUC values
SOFA Score	D1	0.641
SOFA Score	D2	0.680
SOFA Score	D3	0.896
Max SOFA Score		0.859
APACHE II Score		0.639

From the above observation, it was apparent that D3 SOFA score and Max SOFA score are more discriminative value than D1, D2 SOFA score and APACHE II score.

DISCUSSION

Sepsis is the primary cause of death from infection, especially if not recognized and treated promptly. Its recognition mandates urgent attention. Sepsis is a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs.

Sepsis is a syndrome shaped by pathogen factors and host factors (eg, sex, race and other genetic determinants, age, co-morbidities, environment) with characteristics that evolve over time. What differentiate sepsis from infection are aberrant or deregulated host response and the presence of organ dysfunction. Sepsis induced organ dysfunction may be occult; therefore, its presence should be considered in any patient presenting with infection. Conversely, unrecognized infection may be the cause of new onset organ dysfunction. Any unexplained organ dysfunction should thus raise the possibility of underlying infection.

Evidence-based recommendations regarding the acute

management of sepsis and septic shock are the foundation of improved outcomes for the critically ill patients.⁵ The clinical and biological phenotype of sepsis can be modified by preexisting acute illness, long-standing co-morbidities, medication, and interventions.⁶ Specific infections may result in local organ dysfunction with a receptor-mediated deregulated systemic host response following pathogen invasion.⁷ SIRS criteria are present in many hospitalized patients, including those who never develop infection and never incur adverse outcomes (poor discriminate validity). The SIRS criteria do not necessarily indicate a deregulated, life-threatening response. The predictive validity for in-hospital mortality using SOFA score was statistically found to be greater than SIRS and qSOFA, supporting its use in clinical criteria for sepsis in large multi-centric study.⁸ Organ dysfunction can be identified as an acute change in total SOFA score ≥ 2 points consequent to the infection.

The baseline SOFA score can be assumed to be zero in patients not known to have preexisting organ dysfunction. A SOFA score ≥ 2 reflects an overall mortality risk of approximately 10% in a general hospital population with suspected infection. Even patients presenting with modest dysfunction can deteriorate further, emphasizing the seriousness of this condition and the need for prompt and appropriate intervention, if not already being instituted.

The SOFA score is not intended to be used as a tool for patient management but as a means to clinically characterize a septic patient. Components of SOFA (such as creatinine or bilirubin level) require laboratory testing and thus may not promptly capture dysfunction in individual organ systems. Other elements, such as the cardiovascular score, can be affected by iatrogenic interventions. However, SOFA has widespread familiarity within the critical care community and a well-validated relationship to mortality risk.

CONCLUSION

Serial measurement of SOFA score during first week is a very useful tool in predicting the outcome especially on the day 3. The trend of SOFA score was progressively declining in survivors while non-survivors had a stable higher score during the first week.

The APACHE II score on day of admission, though reliable, was not very effective in predicting the mortality rate in our set up.

Conflict of interest: None declared.

Ethical clearance: Taken.

Source of funding: None declared.

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

REFERENCES

1. Knaus WA, Draper EA, Wagner DP, Zimmerman JE. *APACHE II: a severity of disease classification system. Critical Care Medicine* 1985;13(10):818–29.
2. Vincent JL, de Mendonça A, Cantraine F, Moreno R, Takala J, Suter PM et al. Use of the SOFA scores to assess the incidence of organ dysfunction/failure in intensive care units: results of a multicenter, prospective study. Working group on “sepsis-related problems” of the European Society of Intensive Care Medicine. *Crit Care Med* 1998;26(11):793–800.
3. Shankar-Hari M, Phillips GS, Levy ML, Seymour CW, Liu VX, Deutschman CS et al. Developing a New Definition and Assessing New Clinical Criteria for Septic Shock. *JAMA* 2016;315(8):775–787.
4. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *JAMA* 2016;315(8):801–810.
5. Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, Opal SM et al. Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock. *Crit Care Med* 2013; 41(2):580–637.
6. Angus DC, van der Poll T. Severe sepsis and septic shock. *N Engl J Med* 2013;369(9):840–851.
7. Wiersinga WJ, Leopold SJ, Cranendonk DR, van der Poll T. Host innate immune responses to sepsis. *Virulence* 2014;5(1):36–44.
8. Seymour CW, Liu VX, Iwashyna TJ, Brunkhorst FM, Rea TD, Scherag A et al. Assessment of Clinical Criteria for Sepsis for the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *JAMA* 2016;315(8):762–774.

ORIGINAL PAPER

Study on Sero-prevalence of Rubella in Pregnancy' in Relation to Socio-economic Status

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ABSTRACT

The present study was under taken with a purpose to study the sero-prevalence of rubella in pregnant woman and to examine its relation with socio-economic status. The present study was carried for a duration of one year taking up a total of 81 pregnant women admitted or attending the outdoors of Obstetrics & Gynaecology departments in Gauhati Medical College & Hospital, Guwahati, having different ethnic backgrounds, after approval of the Institutional Ethical Committee. Among the total of 81 samples, sero-positivity of rubella virus was seen using IgG as the serological marker. The cases were studied in three age groups as '16-20' years, '21-30' years and '31-40' years. Four socio-economic statuses were taken for the study as "economically weaker section", "lower income group", "middle income group" and "higher income group". The socio-economic status of the study group was evaluated according to the different economic categories formulated by 'Housing and Development Co-Operative Organization'. The data recorded was analysed statistically using Student's T-test. P value < 0.05 is considered as statistically significant. Such a study may be useful in prevention and treatment of rubella virus.

Keywords: Rubella, Sero-positive, Socio-economic

INTRODUCTION

Infection during pregnancy has been documented since the writings of Hippocrates. Obstetrics practice in western world does not reflect what happens elsewhere.¹ But in the world, half a million pregnant women die each year, many from such infection. Rubella is one of the frequent causes of intra-uterine acquired infection in human species. Rubella virus infection acquires a special significance in pregnant women as the virus may enter the fetal circulation through the placenta.² Unfavourable outcome to pregnancy has become a serious problem in the society. Rubella virus infection during pregnancy can be a serious threat to the fetus with possible loss of pregnancy and

diseases of newborn of which, encephalitis, hepatomegaly, neuritis, orchitis, thrombocytopenic purpura are the hallmarks of infection. Rubella or German measles is a exanthematous fever characterized by transient macular rash and lymphadenopathy. In itself, the disease is trivial but rubella in the pregnant woman may lead to congenital malformation in the baby.³ The infection is transmitted during passage through contaminated uterine cervix during birth, by transplacental transmission, from human milk by breast feeding or from banked milk, transmitted from other children in the newborn nursery and in day-care centers, transmitted through blood, through sexual contacts and through contacts with urine and other body secretions like saliva, semen etc.⁴ Primary maternal rubella infection during the first semester of pregnancy causes high risk for the development of congenital rubella with malformations of heads, eye and ear.^{5,6,7,8,9,10,11}

OBJECTIVES

1. To study sero-prevalence of rubella in different ages of pregnant female. 2. To find out whether there is any significant relationship of sero-positive rubella cases with socio-economic status.

MATERIALS AND METHODS

Materials: 5 ml of venous blood was collected aseptically in a sterile vial. The vial was left at room temperature and the blood was allowed to clot. The serum was separated by centrifuging the whole blood in a centrifuge machine at 3,000 revolutions per minute for 5 minutes. The separated serum was then transferred to a sterile vial, labelled and stored at 2 degree to 8 degree

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centigrade till the assay was done. The serum was separated by centrifuging the whole blood in a centrifuge machine at 3,000 revolutions per minute for 5 minutes. The separated serum was then transferred to a sterile vial, labelled and stored at 2 degree to 8 degree centigrade till the assay was done. Serum samples were tested by Enzyme Linked Immuno Sorbent Assay for IgG to rubella virus using the commercially available kit (NOVATEC IMMUNDIAGNOSTICA GMBH) manufactured by Germany with lot no.RUBG-013.

Method: The present study was carried for a duration of one year taking up a total of 81 pregnant women admitted or attending the outdoors of Obstetrics and Gynaecology departments in Gauhati Medical College & Hospital, Guwahati.

Selection of Cases: In the present study 81 cases of pregnant women were selected. Amongst them some were Primi gravidae; some were multiparous women with bad obstetric histories like recurrent spontaneous abortion, threatened abortion, missed abortion, intrauterine growth retardation, intrauterine death, congenitally malformed foetus and neonatal death. The socio-economic of the cases of both control and the study group was evaluated according to the different economic categories formulated by HOUSING AND DEVELOPMENT CO-OPERATIVE ORGANIZATION.

OBSERVATION & RESULTS

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Total and sero-positive cases of rubella in different age group

Age group	Total cases	Sero positive cases
16-20	10	1
21-30	53	11
31-40	18	4
SUM	81	16
MEAN	27.00	5.33
SD	±22.869	±5.132
SEM	±13.203	±2.962

For three different age groups, it is seen that the number of sero-positive cases of rubella ranges from 1 to 11 with a mean value of 5.33, Standard Deviation ± 5.132 and Standard Error of Mean ± 2.962 as evident from **Table 1**.

Table 2 Frequency distribution of sero-positive cases

Class interval of age group	Sero-positive rubella cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
16 to 20 years	1	0.062	6.200
21 to 30 years	11	0.687	68.700
31 to 40 years	4	0.251	25.100
Sum	16	1.000	100.000

Table 2 shows that highest number of rubella cases are found in the class interval of '21 to 30' years with a relative frequency of 0.687, simple frequency of 11 and a percentage of 68.700. The lowest number of rubella cases are found in the class interval of

'16 to 20' years with a relative frequency of 0.062, simple frequency of 1 and a percentage of 6.200 as evident in **Figure 1**.

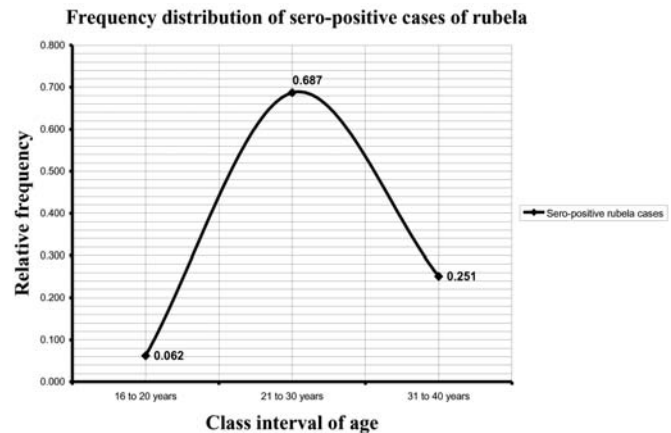


Figure 1 Relative frequency

Table 3 Sero-positive rubella cases for different socio-economic status

Socio-economic status	Total number of cases	Sero-positive cases
Economically Weaker Section	34	8
Lower Income Group	20	4
Middle Income Group	20	3
Higher Income Group	7	1
SUM	81	16
MEAN	20.25	4
SD	±11.026	±2.944
SEM	±5.513	±1.472

For four groups of different socio-economic status, it is seen that the number of sero-positive cases of rubella ranges from 1 to 8 with a mean value of 4, Standard Deviation ± 2.944 and Standard Error of Mean ± 1.472 as evident from **Table 3** and **figure 2**.

Number & percentage of sero-positive cases of rubella in different socio-economic status

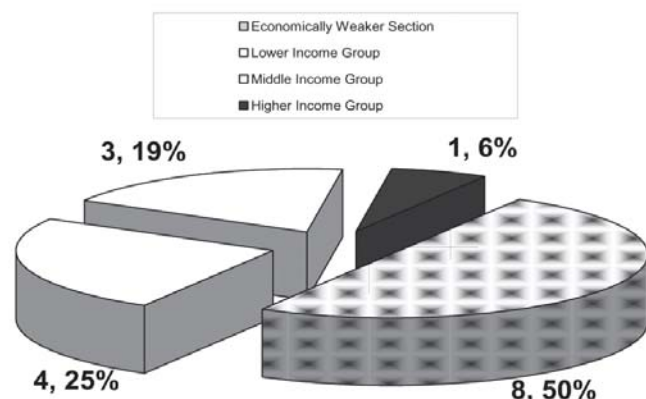


Figure 2 Sero positive cases of rubella

Table 4 Frequency distribution of sero-positive cases

Class interval of socio-economic status	Sero-positive rubella cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
Economically Weaker Section	8	0.501	50.100
Lower Income Group	4	0.250	25.000
Middle Income Group	3	0.187	18.700
Higher Income Group	1	0.062	6.200
Sum	16	1.000	100.000

Table 4 shows that highest number of rubella cases are found in the class interval of 'Economically Weaker Section' with a relative frequency of 0.501, simple frequency of 8 and a percentage of 50.100. The lowest number of rubella cases are found in the class interval of 'Higher Income Group' with a relative frequency of 0.062, simple frequency of 1 and a percentage of 6.200 as evident in **Figure 3**.

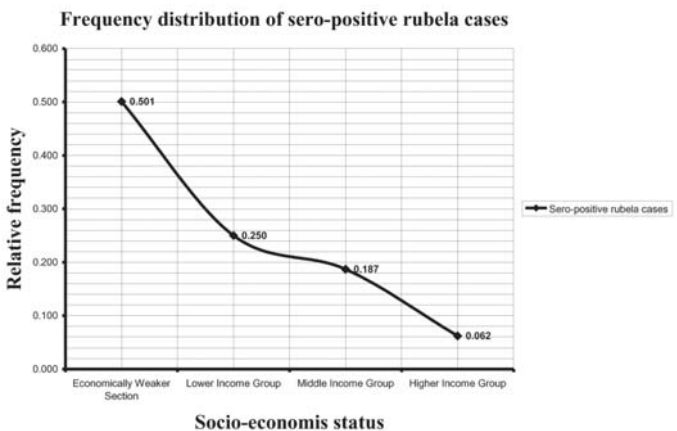


Table 5 Frequency distribution of sero positive cases

Class interval of socio-economic status	Sero-positive rubella cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
Economically weaker & lower income group	6	0.501	50.100
Middle & higher income group	2	0.166	16.600
Combination of all socio economic group	4	0.333	33.300
Sum	12	1.000	100.000

Table 5 shows that highest number of rubella cases are found in the class interval of 'Economically weaker & lower income group' with a relative frequency of 0.501, simple frequency of 6 and a percentage of 50.100. The lowest number of rubella cases are

found in the class interval of 'Middle & higher income group' with a relative frequency of 0.166, simple frequency of 2 and a percentage of 16.600 as evident in **Figure 4**.

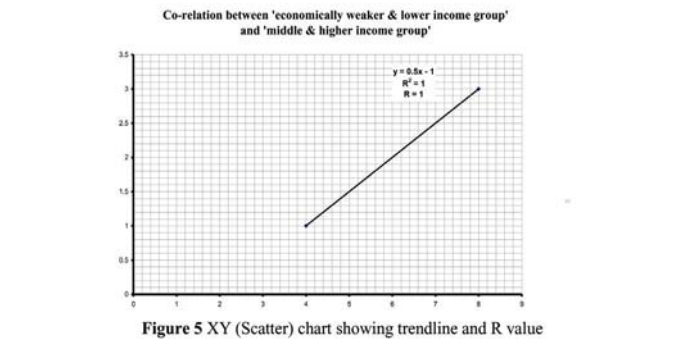
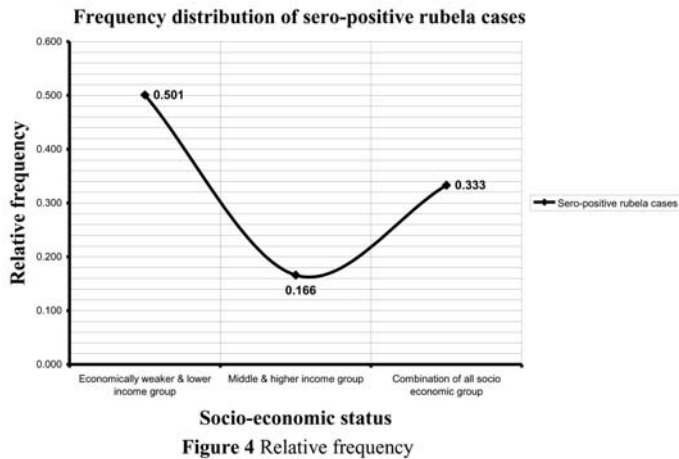


Table 5 Level of significance of differences between the various categories

Serial number	Comparison of mean between	"t"	P
1	'economically weaker & lower income group' and 'middle & higher income group'	1.633	P > 0.05
2	'all groups' and 'economically weaker & lower income group'	0.805	P > 0.05

DISCUSSION

Studies have shown that less than 50%-70% (mean 60%) of pregnant and non-pregnant women aged 20-40 years from middle and upper socio-economic groups have antibodies to rubella compared with 71.8% of those from lower economic scale.^{12,13,14} Crowded conditions in lower class population might increase the chances of exposure to rubella infection.¹⁵ A lot of research has been conducted till date on 'rubella virus' in relation to socio-economic status. Most of the studies have concluded that rubella infection is related to lower socio-economic status. Our study is consistent with this universal observation.

Difference between different socio-economic group have been measured in matched sets of observation using the null hypothesis: Reject H_0 if $P \leq t_{\alpha}$ when $t_{\alpha} = t_{0.05}$ setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing differences in socio-economic groups between the tested groups.

CONCLUSION

The present study reveals that the number of sero-positive rubella cases is much higher in the age group of '21-30' years than the other two groups i.e. '31-40' years and '16-20' years.

On the other hand, sero-positive rubella cases from highest to

lowest number in relation to socio-economic status are respectively “economically weaker section”, lower income group”, “middle income group” and “higher income group”. When “economically weaker and lower income group” is compared with “middle and higher income group”, then the cases in the first category is much higher than the cases in the second category, but without any significance ($p>0.05$) and there is strong correlation between this two ($R=1$).

So, we can conclude that highest number of Rubella incidence can be found in the age group of ‘21-30’ years and highly affected people are of “economically weaker section”.

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REFERENCES

1. MacLean AB and Cockburn F. Maternal and perinatal infection. Dewhursts Text book of obstetrics & Gynaecology for post graduates. 1995;5:471-493.
2. Harrison KA. Maternal mortality in developing countries; Br J Obstet. Gynaecol. 1989; 96:1-3.
3. Jawaetz, Melnick & Adelbergs. Rubella, chapter 40, Medical Microbiology. 2004;23: 506-569.
4. Miller E, Cradock-Watson JE, Pollock TM. Consequences of confirmed maternal rubella at successive stages of pregnancy. Lancet. 1982;2:781-4.
5. Cooper LZ & Krugman S. Clinical Manifestations of Postnatal and Congenital Rubella. Arch Ophthalmol. 1967;77:434-9.
6. Cooper LZ, Ziring PR, Ockerse AB, Fedun BA, Kiely B & Krugman S. Rubella- Clinical Manifestation and Management. Amer J Dis Child. 1969;11:18-29.
7. Cradock-Watson JE, Ridehalg MKS, Anderson MJ, Pattison JR. Outcome of asymptomatic infection with Rubella virus during pregnancy. J Hyg. 1981;87:147-54.
8. Dudgeon JA. Congenital Rubella - A preventable disease. Postgrad Med J. 1972;48:7-11.
9. McEvoy GK (Ed). Drug Information 97, American Hospital Formulary Service, American Society of Hospital Pharmacists, Bethesda, MD. 1997;1:2645.
10. Robertson SE, Cutts FT, Samuel R, Diaz-Ortega JL. Control of rubella and congenital rubella syndrome in developing countries. vaccination against rubella. Bull World Health Organ. 1997;2(75):69-80.
11. Tartakow IJ. The teratogenicity of maternal rubella. J Pediatr. 1965;66:380-1.
12. Cooper LZ, Ziring PR, Ockerse AB, Fedun BA, Kiely B & Krugman S. Rubella- Clinical Manifestation and Management. Amer J Dis Child. 1969;11:18-29.
13. Seth P, Balaya S, Mohapatra LN. Seroepidemiological study of Rubella infection in female subjects of Delhi and its surrounding villages. Indian J Med Res. 1971;59:190-94.
14. Vijaylakshmi P, Anuradha R, Prakash K, Narendran K, Ravindran M & Prajna L. Rubella serosurveys at three Arvind Eye Hospitals in Tamil Nadu, India. Bulletin of the World Health Organization. 2004;82:259-64.
15. Yadav S, Gupta S & Kumar S. Seroprevalence of Rubella in women of reproductive age. Indian J Pathol Microbiol. 1995;38(2):139-142.

ORIGINAL PAPER

Awareness and Knowledge of Contraception Among Parous Women and Contraceptive Usage by Them

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ABSTRACT

Objective: To evaluate the knowledge of different contraceptive methods among parous women and contraceptive usage by them.

Methods: In this study 240 parous women in the reproductive age groups were questioned as per a predesigned questionnaire after taking informed consent. These women were randomly picked up when they visited the hospital as attendants of patients. **Results:** We found awareness of contraception was 80% in our study, but amongst these women only 53% practiced contraception. **Conclusion:** Knowledge about the methods of contraception was encouraging but the actual practice of contraception was poor.

Keywords: Parous women; contraception methods; MTP; IUCD; OCP; PPIUCD (Post Partum Intra Uterine Contraceptive Device)

INTRODUCTION

With an estimated population of 1.2 billion, India is the second most popular country in the world. India was the first country to implement a national population control programme in 1952, but it has failed miserably in controlling the population growth. In India population is increasing at the rate of 16 million each year,¹ but total fertility of the world has declined to 2.6 children in 2005-2010² Increasing the contraception knowledge, contraceptive practices and proper implementation of family planning services can ultimately stabilize the population and improve the health of the population. Contraceptive advice is a component of good preventive health care. According to NFHS-3³ about 30% of the fertility in India was unwanted, indicating a huge gap between the demand and supply of family planning. The essential aim of family planning service is to prevent the unwanted pregnancies. The contraceptive use in post partum period is a very important matter for family planning programme as delay in contraceptive use until return of menstruation might increase the unwanted pregnancy.⁴

Considering the above factors the following study was carried

out in to assess the knowledge of contraceptive methods among parous women.

Aim and Objective: To assess the knowledge, attitude and practices of contraception amongst parous women in the reproductive age group.

MATERIAL AND METHODS

This cross sectional study was conducted over a period of 6 months from 1st March 2015 to 31st Aug 2015. A total of 240 women coming to Gauhati Medical College and Hospital as attendants of patients were interviewed with a pre-designed questionnaire after taking informed consent. Women, who had delivered at least one child, still married and in the reproductive age group were taken up for the study. These women at the time of interview were not suffering from any illness. The women were classified according to their age, religion, parity and educational status. They were asked about their awareness of spacing between births, knowledge of medical termination of pregnancy, different contraceptive methods available and whether they have used any method or methods.

Inclusion criteria: (i) Women having at least one child, (ii) Women married and living with their husbands and (iii) Women in the reproductive age group.

Exclusion Criteria: Women who are medically incapable to beget the child.

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RESULTS

The socio demographic analysis of data showed, out of 240 women interviewed, the maximum women were between 31-35 years (33.3%) followed by 21-25 years (20.83%). 61% were para one followed by 22% para two. Maximum women were married at the age of 21-25 years (45.5%), but 18.8% were below 18 years. In our study education upto primary were 9.2%, high school were 23.7%, higher secondary were 20%, graduate were 21.6% and post graduate were 9.2% and illiterate were 16.3%.

Table 1 Knowledge about different contraceptive methods

Knowledge	No.	Percentage
Heard or aware of Contraceptives	192	80%
Oral Pills	180	75%
Condom	160	66.7%
IUCD	136	56.7%
Tubectomy	112	46.7%
Vasectomy	80	33.3%
Injection	51	21.3%
Coitus Interruptus	22	9.2%
LAM	22	9.2%
Safe Period	18	7.5%
Emergency Contraception	18	7.5%

Table 2 Source of Awareness

Source of awareness	No. (192)	Percentage
Doctor	56	29.2%
Other health worker	48	25%
Television	36	18.7%
Poster, Newspaper	28	14.6%
Social circle	24	12.5%

Out of 240 women, 192 (80%) were aware of one or more methods of contraception. 180 (75%) were aware about oral contraceptive pills, 160 (66.7%) were aware about condom, 136 (56.7%) were aware of IUCD and 112 (46.7%) were aware of tubectomy. Some of them were aware of more than two methods. Their sources of information were mainly from doctors and other health personnel (54.2%). 48 (20 %) women didn't know about any method of contraception.

Table 3 Contraceptive practices amongst the respondents aware of contraception

Contraceptive Practice	No (192)	Percentage
Practicing some method	102	53%
Not Practicing any method	90	47%

Table 4 Different methods of contraception used among users

Contraceptive Methods	No. (102)	Percentage
OCP	48	47.1%
Condom	30	29.4%
IUCD	16	15.7%
Tubectomy	6	5.9%
Injection	2	1.9%

Contraceptive usage in our study was 53.1% amongst women who were aware of contraceptive methods. Of the different methods, oral pills were most popular followed by barrier method.

Table 5 MTP done amongst the study group

Medical termination of pregnancy	No. (240)	Percentage
MTP done	98	40.8%
MTP not done	142	59.2%

In our study we found that out of 240 women questioned, 98(40.8%) had undergone termination of pregnancy at least once in their married life. Some had done MTP more than one time. They were more worried about side effects of contraceptive methods rather than worrying about doing an MTP.

Table 6 Association between Education and use of contraception

Educational Scale	No. (240)	Users	Percentage of users in the subgroup
Illiterate	39	18	46%
Primary School	22	12	54%
High School	57	18	31%
Higher Secondary School	48	25	52%
Graduate	52	21	40%
Post Graduate	22	8	36%

In our study we didn't find any association between education and use of contraceptive methods.

DISCUSSION

The phenomena of high knowledge about contraception and low practice has been observed in multiple studies conducted in various parts of India as reported by Anupama Srivastava et al (awareness 71.22%, practice 51.7%),⁵ S K Bhasin et al (awareness 90%, practice 59.8%)⁶ and a broad like in the study conducted by Onwuzurike BK et al in Nigeria.⁷ Evidence from a number of studies in various parts of the country indicates inadequate knowledge of contraceptive methods as a reason for not accepting family planning. In our study 80% were aware of it or more methods of contraception like study of Lavanya Kumari et al (87.7%),⁸ Srivastava R et al (82.8%),⁹ Sunita TH et al (100%),¹ Ambareen Khan et al (81%).¹⁰

In our study about 53.1% women used some contraception, which is comparable to Lavanya Kumari et al (53.8%)⁸ Sunita et al (52%),¹ Tuladhar et al of Nepal (33.5%),¹¹ Al Turkey et al of Saudi Arabia (74%)¹² and Arbab AA et al of Qatar (47.8%),¹³ Pranchi et al (55%).¹⁴

In our study among users maximum women used oral contraceptive pills (47.1%) for contraception as decision to use of OCP was either taken by the women herself or by the couples, not influenced by other family members which is comparable to the results of Anupama Srivastava et al (45.36%)⁵ and Alakananda et al (66.6%).¹⁵ Low level of use of IUCD (15.7%) and tubectomy (5.9%) in spite of knowledge were because decision making

involved not only couples but also in-laws and other family members, preference to male child was another cause.

In this study non-user 47% with similar results 52%,¹ 55.5%⁸ and 46%,¹⁴ cause stated to be fear and myths about side effects, reluctance to use and interference by husband and in laws.

In our study knowledge about emergency contraception was low 7.5% similar to the findings of S Chopra et al¹⁶ and R Tripathy et al.¹⁷ In our study main source of awareness was from doctors and other health personnel (54.2%) but other studies show TV/ Radio/ Posters, etc. were the main source of knowledge, Sunita Ghike et al (70%),¹⁸ this may be due to that we included parous women who came in contact with the health personnel during their previous pregnancies and deliveries.

Emphasis should be made on communication and good counseling to the women giving correct information about availability, source, and side effects of contraceptive methods. In our study the major source of information was from health personnel (54.2%). The health workers have a great role to play. There is no doubt that we can reduce maternal mortality and morbidity by creating awareness regarding temporary contraceptive methods among primiparous women. Promoting contraceptive injections and PPIUCD insertion have their own role in improving maternal health.

CONCLUSION

Family planning practice, use of contraceptives in the correct manner, motivation of males towards the usage of male contraceptive measures and educating couples about the benefits of healthy spacing is the need of the hour. Proper counseling can only increase the practice of contraception.

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REFERENCES

1. Sunita TH, Rathnamala M Desai. Knowledge, attitude and practice of contraception among women attending a tertiary care hospital in India. *Int J Reprod Contracept Obstet Gynecol* 2013 Jun;2(2):172-176.
2. World Population Policies 2007 [cited 2011 March 10]; Available from: URL:http://www.un.org/esa/population/publications/wpp2007/Publication_introduction.pdf
3. National family health survey (NFHS-3) India 2005-06, Youth in India [cited 2011 March 15]; Available From: URL:http://www.nfhsindia.org/youth_report_for_website_18sep09.pdf
4. Singh KK, Verma S, Tanti S. Contraceptive Use Among Postpartum Women In India. *Asian Population Studies* 2013;1-17.
5. Anupama Srivastava, Mohammad Shan Khan, Knowledge, Attitude and practices about contraceptive among Married Reproductive Females. *Int J of Scientific Study* 2014 Februar;1(5):2-4.
6. Bhasin SK, Pant M, Metha M, Kumar S. Prevalence of Usage of Different Contraceptive Methods in East Delhi-A Cross Sectional Study. *Indian J of Community Medicine* 2005;30(2).
7. Onwuzurike BK, Uzochukwu BSC. Knowledge, Attitude and Practice of Family Planning amongst women in a high density low income urban of Enugu, Nigeria. *Afr J Repro Health* 2011;5(2):83-89.
8. Lavanya Kumari Sarella, N S L Prasanna. A study on contraceptive knowledge, attitude and practice among reproductive age group women in a tertiary institute. *Intl J of Research in Health Sciences* 2014 April-Jun;2(2):577-580.
9. Srivastava R, Srivastava DK Jina R, Srivas Lavanya Kumari Sarella, N S L Prasanna. A study on contraceptive knowledge, attitude and practice among reproductive age group women in a tertiary institute. *Intl J of Research in Health Sciences* 2014 April-Jun;2(2):577-580.
10. Khan A, Hashmi HA, Naqvi Z. Awareness and Practice of Contraception Among Child Bearing Age Women. *J of Surgery Pakistan (Intl)* 2011;16(4):179-182.
11. Tuladhar H, Marahatta R. Awareness and practice of family planning methods in women attending gyne OPD at Nepal medical college teaching hospital. *Nepal Med Coll J* 2008;10(3):184-191.
12. Al-Turky HA. Contraception: attitudes and experiences of Saudi Arabian women. *Health Care Women Int* 2011;32:134-9.
13. Arbab AA, Bener A, Abdul Malik M. Prevalence awareness and determinants of contraceptive use in Qatari women. *East Mediterr Health J* 2011;17:8-11.
14. Pranchi R, Das G S, Ankur B; Study of Knowledge, attitude and practice of family planning among the women of reproductive age group in Sikkim; *J Obstet Gynecol India* 2003;58:63-67.
15. Alakananda, Apurba B. Contraceptive Awareness- A Survey among antenatal women, Scholars *J of Applied Medical Sciences* 2015;3(3G):1505-1508.
16. Chopra S, Dhaliwal L. Knowledge, attitude and practices of contraception in urban population of North India. *Arch Gynecol Obstet* 2010;281:273-277.
17. Tripathi R, Rathore AM, Sachdeva J. Emergency contraception: knowledge, attitude, and practices among health care providers in North India. *J Obstet Gynecol Res* 2003 Jun;29(3):142-6.
18. Ghike Sunita, Joshi Sulbha, Awareness and contraceptive practices among women-A Indian Rural Experience. *J of South Asian Federation of Obstet Gynecol*, Jan-April 2010;2(1):19-21.

ORIGINAL PAPER

Bacteriological profile and drug-resistance in Urinary Tract Infection from a rural area of Northeast India

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ABSTRACT

Community-acquired Urinary Tract Infection (CA-UTI) is a very common condition and often treated by empirical antibiotic therapy. This has led to the problem of drug resistance in the community pathogens. As information on profile and antibiotic resistance, especially from rural areas is very hard to come by, this study was carried out on adult CA-UTI subjects presenting in a rural tertiary care teaching hospital of lower Assam. Outdoor patients were included and urine samples were tested by standard microbiological methods. Isolated organisms were processed for antibiotic susceptibility and MIC (selected cases). Out of 1436 samples 27.1% was found to have significant bacteriuria by single agents with more infection in female than in male. E coli was the predominant agent (62.2%) followed by Coagulase Negative Staphylococcus (CONS) at 11.8%, Klebsiella (11.3%) and Enterococci (6.3%). High prevalence of drug resistance amongst the isolates was observed, especially against common agent of empirical treatments like Ciprofloxacin, Amoxycalv etc. MIC level of Ciprofloxacin in E coli seemed to be rising and in few cases, level has reached beyond 32mcg/ml. This is alarming for a community pathogen from a rural area. Urgent necessity for an evidence based antibiotic policy cannot be ruled out.

Keyword: Urinary Tract Infection, UTI, Community-acquired Urinary tract infection, Antibiotic misuse, Drug resistance, Multi drug resistance, Fluroquinolone resistance, Ciprofloxacin resistant E Coli, CA-UTI, MIC, E-test

INTRODUCTION

After respiratory tract infection, Urinary tract infection (UTI) is the second commonest community-acquired infection especially rural set up. It is a major public health problem with an estimated 150 million cases per annum worldwide and financial burden in excess of US \$ 6 billion.¹ About 50% of women experience at least one episode of UTI at some point of their lifetime with 20% - 40% ultimately developing recurrent infection.^{2,3} Only 20% of all UTIs occur in men.⁴ UTI is defined as significant bacteriuria with or

without urinary symptoms.^{5,6,7} It may involve only the lower urinary tract or both the upper and lower tract.⁸

Malnutrition, poor hygiene, low socio economic status are associated with UTI especially in rural settings.⁹ Escherichia coli has been found to be the predominant isolate causing UTI, though there are reports of changing patterns.^{10,11}

The introduction of antimicrobial therapy has contributed significantly to the management of UTIs. In almost all cases of community-acquired UTI (CA-UTI), empirical antimicrobial treatment is practiced before the laboratory results of urine culture-sensitivity are available; thus, if evidence based empirical treatment protocol is not followed, a risk of misuse or abuse of antibiotic exists with consequent emergence of drug resistant uropathogens.¹²

The resistance pattern of community-acquired uropathogens from North East India, especially from rural areas, is yet to be reported extensively. To the best of our knowledge, no such data from this area has been published till date. Since most CA-UTIs are treated empirically, the selection of appropriate antimicrobial agents should be determined by the most likely pathogen and its expected resistance pattern in a geographic area. Therefore there is need for periodic monitoring of etiologic agents of UTI, and their resistance pattern in the community, especially in rural backdrop. This study was undertaken keeping in view of filling up the gap in information.

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METHODS

Current study was carried out in a newly established tertiary care medical Institute situated in an interior rural area of lower Assam. The study lasted from January 2013 to December 2014.

A total of 1463 (657 male and 806 female) subjects attending outdoors (OPDs) of the hospital were recruited. Recorded age ranged from 18 to 79 yrs (mean 31 years). Exclusion criteria were i) Age below 18 yrs ii) History of hospital admission/catheterization at least 1 week previously iii) Prior antibiotic use if any iv) Urban patients.

Informed consent from subjects and Ethical clearance from Institutional Ethical Committee was obtained.

Freshly voided, clean catch midstream urine sample was collected from each patient into sterile screw-capped universal container in the Outdoor. The specimen was labeled and transported to the microbiology laboratory for processing within 2 h. Semi quantitative urine culture in Cysteine lactose electrolyte deficient (CLED) medium using a 0.001mL calibrated loop was performed. Colony forming units (cfu) per milliliter (ml) was determined and a single species colony count of 10⁵ cfu/ml urine was taken as significant bacteriuria i.e. UTI. Associated microscopy findings of >10 white blood cells (WBCs) per high power field was considered supportive.¹³ Isolates were identified using standard biochemical tests described elsewhere.^{14,15} After identification, antibiotic susceptibility testing was performed by Kirby-Bauer disc diffusion technique strictly as per CLSI guidelines.¹⁵

Minimum Inhibitory Concentration (MIC) of Ciprofloxacin was estimated in few selected *E coli* isolates employing E-test (Epsilon-meter-Test of bioMérieux Ltd) technique at DBT project research laboratory.¹⁵ Suggestive isolates were preserved at -700C for future molecular testing.

The data were analyzed using Chi-square (χ^2) test, confidence interval (CI), odds ratio (OR) analysis and P-value estimation etc, by standard utilities.

RESULTS

Age distribution of subjects was between 18 to 82 yrs (mean: 37 yrs). Out of a total of 1463 urine samples, 397 (27.1%) yielded significant growth while 1066 samples (72.9%) were either without growth or with non-significant growth. [see Table 1]

Table 1 Positive samples and gender distribution

Gender	Total no of urine specimen			Odds ratio	95% CI	p-value
	Tested	Not infected (%)	Infected (%)			
Male	657	558 (85)	99 (15)	3.306	2.56-4.28	<0.0001
Female	806	508 (63)	298 (37)			
Total	1463	1066 (72.9)	397 (27.1)			

806 (55.1%) cases were female and among these 298 (37%) showed significant bacteriuria. Out of 657 (44.9%) male patients, only 99 (15%) had CA-UTI. Female gender was a significant risk factor for acquiring CA-UTI (OR = 3.306, 95% CI = 2.56 to 4.28, and it was statistically significant (*p*- value of <0.0001) [See Table 1]

Table 2 Effect of age

Age group in years	Female infected	%	Males infected	%	p-value
18-27	92	30.9	8	8.1	<0.0001
28-37	82	27.5	11	11.1	
38-47	41	13.8	9	9.1	
48-57	28	9.4	12	12.1	
58-67	31	10.4	18	18.2	
68 & above	24	8.1	41	41.4	

The prevalence of CA-UTI was maximum in 18-27 years of age group (30.9%), followed by 28-37 yrs (27.5%), in female patients. Whereas in males, majority of the isolates (41.4%) were from patients aged e"68 years [Table 2].

Table 3 Profile of uropathogen

Isolate	Frequency	%
<i>E coli</i>	247	62.2
<i>Klebsiella</i> sp	45	11.3
<i>Proteus</i> sp	16	4.0
<i>Enterobacter</i> sp	3	0.8
<i>Citrobacter</i> sp	2	0.5
<i>Pseudomonas</i>	2	0.5
<i>Enterococcus</i> sp	25	6.3
Coagulase negative <i>Staphylococcus</i> (CONS)	47	11.8
<i>Staphylococcus aureus</i>	10	2.5

Table 3 illustrates the overall frequency of isolates. *Escherichia coli* (see Figure-1) was the most predominant isolate (62.2%), followed by CONS (11.8%), *Klebsiella* spp (11.3%) and *Enterococcus* spp (6.3%). Other species were much lesser in frequency.

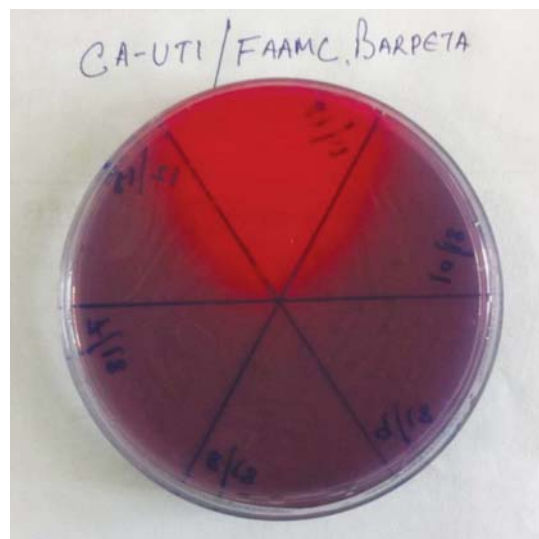


Figure-1 Growth of *E coli* in CLED agar

Table 4 Drug resistance in Gram negative isolates

Isolate	Antibiotic Group/ Antibiotic disc (resistant to)	Frequency	Percentage
<i>E coli</i>	Fluoroquinolone resistance (Ciprofloxacin)	146	59.1
	3 rd Gen Cephalosporin (Cefotaxime/ Ceftazidime)	5	2.0
	Co-trimoxazole	201	81.4
	Nitrofurantoin	49	19.8
	Amoxyclav	129	52.2
	Aminoglycosides (Gentamicin)	45	18.2
	Meropenem	0	0
<i>Klebsiella spp</i>	Fluoroquinolone resistance (Ciprofloxacin)	26	57.8
	3 rd Gen Cephalosporin (Cefotaxime/ceftazidime)	2	4.4
	Co-trimoxazole	29	64.4
	Nitrofurantoin	0	0
	Amoxyclav	28	62.2
	Aminoglycosides (Gentamicin)	8	17.8
	Meropenem	0	0
<i>Proteus spp</i>	Fluoroquinolone resistance (Ciprofloxacin)	6	37.5
	3 rd Gen Cephalosporin (Cefotaxime/ceftazidime)	0	0
	Co-trimoxazole	7	43.8
	Nitrofurantoin	1	6.3
	Amoxyclav	12	
	Aminoglycosides (Gentamicin)	4	75
	Meropenem	0	0

Table 5 Drug resistance in Gram positive isolates

Isolate	Antibiotic Group/ Antibiotic disc (resistant to)	Frequency	Percentage
CONS	Penicillin	43	91.5
	Oxacillin 1 mcg / Cefoxitin 30mcg	0	0
	Vancomycin	0	0
	Linezolid	0	0
	Erythromycin	3	6.4
	Cefazolin	23	48.9
	Amoxyclav	21	44.7
<i>S aureus</i>	Penicillin	10	100
	Oxacillin 1 mcg/Cefoxitin 30mcg	0	0
	Vancomycin	0	0
	Linezolid	0	0
	Erythromycin	4	40
	Cefazolin	3	30
	Amoxyclav	3	30
Enterococcus sp	Penicillin	12	48
	Vancomycin	0	0
	Erythromycin	5	20
	Aminoglycoside (High strength gentamicin)	12	48
	Amoxyclav	9	36

Antimicrobial resistance profiles of the bacterial isolates are summarized in **Table 4** and **Table 5**. Amongst the Gram negatives the predominant isolates i.e. *E coli* and *Klebsiella* showed resistance against Fluoroquinolones (FQs) in more than 59% and 57% isolates respectively. Similar picture emerged in other Gram negatives (e.g. *Proteus*) as well.

Resistance to Amoxyclav (in Gram negatives), Cefazolin (in CONS and *S aureus*), Erythromycin, Cotrimoxazole etc were also of significant proportion (**Table 4 & Table 5**). Few strains of *E coli* and *Klebsiella* showed resistance to 3rd generation cephalosporins (Cefotaxims and Ceftazidims), suggesting probable ESBLs (extended spectrum beta-lactamase producers), but number of such strains were too less, to ascertain if these were purely community acquired or not. Perhaps a more thorough history taking was necessary. No Oxacillin 1mcg/Cefoxitin 30mcg resistant CONS or *S aureus* (hence no MRSA), neither any Vancomycin resistant Enterococcus were found. Almost half of the Enterococci isolates (48%) were resistant to high strength gentamicin disc.

Table 6 MIC of Ciprofloxacin (E-test strip of bioMérieux i.e. CIPROFLOXACIN CI 32 WW B30) in 26 selected isolates of *E Coli*

Isolate (number)	Result of Disc diffusion (CLSI 2013 guidelines)	MIC (mcg/ml) in E test strip	Frequency
<i>E coli</i> (n=22)	Resistant (i.e. zone diameter ≤ 15 mm)	0.002 – 0.75	0
		1.0	1
		1.5	0
		2	0
		3	3
		4	7
		6	4
		8	4
		12	1
		16	0
		≥ 32	2
<i>E coli</i> (n=4)	Intermediate (Zone Diameter 16-20mm)	0.002 – 0.75	0
		1.0	3
		1.5	0
		2	1
		3	0

Selected *E coli* isolates were tested for Ciprofloxacin MIC (Minimum Inhibitory Concentration) by E test technique as per CLSI guidelines 2013.¹⁵ (**Figure 2**) Out of 22 resistant phenotype, 18 isolates yielded Ciprofloxacin MIC in pure resistant range i.e. ≥ 4 mcg/ml out of which two (2) isolates showed MIC > 32 mcg/ml. (**Figure 3 and Figure 4**)

**Figure-2** MIC by E test on *E.coli* reference strain (ATCC25922)



Figure-3 MIC of Ciprofloxacin >32mcg/ml (Highly resistant *E.coli*)



Figure-4 Second strain of *E. coli* with MIC of Ciprofloxacin >32mcg/ml

Three isolates showed Ciprofloxacin MIC of 3mcg/ml, which is above the intermediate sensitivity value i.e. 2 mcg/ml.¹⁵ One isolate surprisingly yielded a MIC value in sensitive range (=1 mcg/ml). This may be due to some discrepancy in disc diffusion testing earlier. [Table 6]

Four (4) *E. coli* strains in intermediate zone (16-20 mm), were also tested for Ciprofloxacin MIC, and 3 of them had MIC in sensitive range (1mcg/ml) while a single strain had intermediate value. [Table 6]

DISCUSSION

From total 1463 urine samples collected from CA-UTI patients 397 (27.1%) yielded significant pathogens. Similar result was obtained by Oladeinde *et al.* in rural community of Nigeria and Dash *et al* in rural Odisha (Orissa).^{16,17} But lower rates were estimated by studies conducted in Jaipur, India (17.19%) and Aligarh, India (10.86%).^{18,19} Orrett *et al* and Garcia Morma *et al.* had obtained higher significant uropathogens.^{20,21} Geographical location may be the explanation for this difference. This Study showed higher prevalence of UTI in females (37%) than in males (15%) which agrees with findings of earlier studies.^{16,17,19,22} The age group analysis showed that young female patients in the range of 18-37 years had highest prevalence rate (58.4%) of CA-

UTI. This result is in agreement with previous studies.^{18,19,23,24} Elderly males (≥68 years) had a higher incidence of CA-UTI (41.4%) compared to elderly females (8.1%). This corroborates with Sood *et al.*¹⁹ Explanation probably lies in the fact that with advancing age, the incidence of UTI increases in males due to prostate enlargement, neurogenic bladder etc.²⁵ In our study Gram negatives (79.3%) dominated, and *E. coli* was the overwhelmingly predominant isolate (62.2%). CONS (11.8%), *Klebsiella* sp (11.3%) and *Enterococcus* spp (6.3%) were some next common isolates. The finding was similar to those described in some previous studies.^{19,26,27} Garcia-Morma *et al.*, found out that *E. coli* was the commonest organism in UTI (24.7%), followed by *Candida albicans* (23.7%).²¹ The data collected from around the world, also showed that *E. coli* and *Klebsiella* spp. are still the commonest isolates in CA-UTI patients.^{18,28,29,30} Two (2) *pseudomonas* spp isolates were probably linked with colonization or not community acquired.

Generally, uncomplicated UTIs are treated empirically in the community with short courses of oral antibiotics. In most cases, microbiological evaluation of UTI cases were conducted only following treatment failure, recurrent or relapsing infection. This study has revealed that isolates especially *E. coli* have developed alarming level of resistance to commonly used empirical antibiotics e.g. fluoroquinolones, Amoxycylav, cotrimoxazole etc. Similar finding was noted down by previous studies carried out elsewhere in India.^{17,19,28,31} It is a matter of concern that the high MIC level is being attained by *E. coli* against fluoroquinolones (Ciprofloxacin). Four (4/26) strains had MIC level of 8mcg/ml while another isolate (1/26) showed MIC level of 12 mcg/ml. Most importantly Two (2/26) isolates had MIC of Ciprofloxacin above 32mcg/ml. Situation is alarming as quinolones are first line drug in empirical therapy of CA-UTI. It is worth mentioning that due to selection pressure mutant (in DNA gyrase/Topoisomerase etc.) strain can quickly establish predominance in a population, resulting in widespread drug resistance.³² Ciprofloxacin resistant uropathogens could also be highly resistant to Amoxycylav, Ceftriaxone, Cefuroxime etc.³³

These high resistant rates among uropathogens from a rural population with poor access to health care raises question about selection pressures that generate, maintain and spread resistant strains in the community. It is also possible that due to poor access to health care services, irrational prescription of antimicrobials which are available over the counter in India, has contributed to this alarming situation. Unqualified practitioners, untrained pharmacists and nurses may use antimicrobials indiscriminately.³⁴ Similar practices have also been reported from other developing countries.^{35,36} The widespread use of antimicrobials in veterinary practice may be another possible factor for the emergence of resistant strains.

CONCLUSION

Escherichia coli are most likely the commonest pathogen causing CA-UTI in the rural population. Due to misuse of antibiotic in the empirical therapy, it is leading to selection of high resistant phenotypes. MIC level (e.g. Ciprofloxacin against *E. coli*) is going up even in rural setup, posing a great public health challenge in developing and 3rd world countries.

Poverty, inadequate access to drugs, increased use and misuse of antibacterial drugs, over the counter availability of antibacterial drugs are the major forces in the development of resistance.³⁷ A proper evidenced based antibiotic policy is the need of the day to stem the emergence of resistant strains in community acquired UTI.

Conflicts of interest: None declared.

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

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REFERENCE

- Gonzalez CM, Schaeffer AJ. Treatment of urinary tract infection: What's old, what's new, and what works. *World J Urol* 1999;17:372-82.
- Rock W, Colodner R, Chazan B, Elias M, Raz R. Ten years surveillance of antimicrobial susceptibility of community acquired *Escherichia coli* and other uropathogens in northern Israel (1995-2005). *Isr Med Assoc J* 2007;9:803-5.
- Vasquez Y, Hand WL. Antibiotic susceptibility patterns of community acquired urinary tract infection isolates from female patients on the US (Texas) Mexico Border. *J Appl Res* 2004;4:321-6.
- Griebbling TL. Urinary tract infection in men. In: Litwin MS, Saigal CS, editors. *Urology Diseases in America*. DHHS, PHS, NIH, NIDDK. Washington DC: GPO; 2007. NIH publication 07-5512:621-45.
- Zelikovic I, Adelman RD, Nancarrow PA. Urinary tract infections in children. An update. *West J Med* 1992;157:554-61.
- Kaas E H. The Meaning of "Significant Bacteriuria". *JAMA*. 1963;184(9):728-729. doi:10.1001/jama.1963.03700220103026
- Sobel JD, Kaye D. Urinary tract infections. In: Mandell GL, Bennett JE, Dolin R, editors. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. Philadelphia: Churchill Livingstone; 2010. p. 957-85.
- Hanna-Wakim RH, Ghanem ST, El Helou MW, Khafaja SA, Shaker RA, Hassan SA, et al. Epidemiology and characteristics of urinary tract infections in children and adolescents. *Front Cell Infect Microbiol*. 2015 May 26;5:45. doi: 10.3389/fcimb.2015.00045
- Ahmed SM, Avasara AK. Urinary tract infections (UTI) among adolescent girls in Karimnagar District, AP K.A.P STUDY. *Indian J Pre Soc Med* 2008;39:12-5.
- Omoriegie R, Erebor JO, Ahonkhah I, Isobor JO, Ogefere HO. Observed changes in the prevalence of uropathogens in Benin City, Nigeria. *NZJ Med Lab Sci* 2008;62:29-31.
- Omoriegie R, Eghafona NO. Urinary tract infection among asymptomatic HIV patients in Benin City, Nigeria. *Br J Biomed Sci* 2009;66:190-3.
- Tambekar DH, Dhanorkar DV, Gulhane SR, Khandelwal VK, Dudhane MN. Antimicrobial susceptibility of some urinary tract pathogens to commonly used antibiotics. *Afr J Biotechnol* 2006;5:1562-5.
- Kass EH. Bacteriuria and the diagnosis of infections of the urinary tract; with observations on the use of methionine as a urinary antiseptic. *AMA Arch Intern Med* 1957;100:709-14.
- Duguid J P, Collee J G, Fraser A G. Laboratory strategy in the diagnosis of infective syndromes. In: Collee J G, Duguid J P, Fraser A G, Marmion B P, editors. *Mackie & McCartney Practical Medical Microbiology*. 13th ed. Edinburgh: Churchill Livingstone; 1989. p.600-649
- Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing: Twenty Third Informational Supplement. CLSI document M100 S23. Wayne, PA: USA. Clinical and Laboratory Standards Institute, 2013 Jan. Villanova, Pa
- Oladeinde BH, Omoriegie R, Olley M, Anunibe JA. Urinary tract infection in a rural community of Nigeria. *N Am J Med Sci* 2011;3:75-7.
- Dash M, Padhi S, Mohanty I, Panda P, Parida B. Antimicrobial resistance in pathogens causing urinary tract infections in a rural community of Odisha, India. *Journal of Family and Community Medicine* 2013;20(1):20-26
- Akram M, Shahid M, Khan AU. Etiology and antibiotic resistance patterns of community acquired urinary tract infections in J N M C Hospital Aligarh, India. *Ann Clin Microbiol Antimicrob* 2007;6:4.
- Sood S, Gupta R. Antibiotic resistance pattern of community acquired uropathogens at a tertiary care hospital in Jaipur, Rajasthan. *Indian J Community Med* 2012;37:39-44.
- Orrett FA. Urinary tract infection in general practice in a rural community in south Trinidad. *Saudi Med J* 2001;22:537-40.
- García Morúa A, Hernández Torres A, Salazar de Hoyos JL, Jaime Dávila R, Gómez Guerra LS. Community acquired urinary tract infection etiology and antibiotic resistance in a Mexican population group. *Rev Mex Urol* 2009;69:45-8.
- Kashef N, Djavid GE, Shahbazi S. Antimicrobial susceptibility patterns of community acquired uropathogens in Tehran, Iran. *J Infect Dev Ctries* 2010;4:202-6.
- Shaifali I, Gupta U, Mahmood SE, Ahmed J. Antibiotic susceptibility patterns of urinary pathogens in female outpatients. *N Am J Med Sci* 2012;4:163-9.
- Hooton TM, Scholes D, Hughes JP, Winter C, Roberts PL, Stapleton AE, et al. A prospective study of risk factors for symptomatic urinary tract infection in young women. *N Engl J Med* 1996;335:468-74.
- Das RN, Chandrashekhar TS, Joshi HS, Gurung M, Shrestha N, Shivananda PG. Frequency and susceptibility profile of pathogens causing urinary tract infections at a tertiary care hospital in western Nepal. *Singapore Med J* 2006;47:281-5.
- Dias Neto JA, Martins AC, Tiraboschi RB, Domingos AL, Cologna AJ, Paschoalin EL, et al. Community acquired urinary tract infection: Etiology and bacterial susceptibility. *Acta Cir Bras* 2003;18:33-6.
- Khameneh ZR, Afshar AT. Antimicrobial susceptibility pattern of urinary tract pathogens. *Saudi J Kidney Dis Transpl* 2009;20:251-3.
- Kothari A, Sagar V. Antibiotic resistance in pathogens causing community acquired urinary tract infections in India: A multicenter study. *J Infect Dev Ctries* 2008;2:354-8.
- Selvakumar BN, Jasmine R. Antibiotic Susceptibility of ESBL producing urinary isolates at a tertiary care hospital in Tiruchirappalli, South India. *J Med Sci* 2007;7:443-6.
- Bano K, Khan J, Begum RH, Munir S, Akbar N, Ansari JA, et al. Patterns of antibiotic sensitivity of bacterial pathogens among urinary tract infections (UTI) patients in a Pakistani population. *Afr J Microbiol Res* 2012;6:414-20.
- Sabharwal ER. Antibiotic susceptibility patterns of uropathogens in obstetric patients. *N Am J Med Sci* 2012;4:316-9.
- Fu Y, Zhang W, Wang H, Zhao S, Chen Y, Meng F et al. Specific patterns of gyrA mutations determine the resistance difference to ciprofloxacin and levofloxacin in *Klebsiella pneumoniae* and *Escherichia coli*. *BMC Infect Dis*. 2013 Jan 7;13:8. doi: 10.1186/1471-2334-13-8.
- Jakribettu R P, Ahamed SM, Safeera MI, Faseel P, Shakir VPA, Arya B. Community acquired UTI-minimum inhibitory concentration ciprofloxacin in uropathogens detected resistant to ciprofloxacin by disc diffusion method from rural tertiary care centre in Kerala. *Annals of Biological Research*, 2013; 4 (8):117-123
- Rao GG. Risk factors for the spread of antibiotic resistant bacteria. *Drugs* 1998;55:323-30.
- Wachter DA, Joshi MP, Rimal B. Antibiotic dispensing by drug retailers in Kathmandu, Nepal. *Trop Med Int Health* 1999;4:782-8.
- Larsson M, Kronvall G, Chuc NT, Karlsson I, Lager F, Hanh HD, et al. Antibiotic medication and bacterial resistance to antibiotics: A survey of children in a Vietnamese community. *Trop Med Int Health* 2000;5:711-21.
- Bhargavi P.S, Gopala Rao T.V, Mukkanti K, Dinesh Kumar B, Krishna T.P. *International Journal of Microbiology Research*, 2010; 2, p. 01-06.

ORIGINAL PAPER

A Comparative Study of Serum Magnesium and Serum Inorganic Phosphate Concentration in Hypertensive and Normotensive Women

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ABSTRACT

Background: Hypertensive disorders during pregnancy are one of the main causes of maternal death worldwide. Hypertensive disorder during the period of pregnancy is a major cause of maternal death in India and also the rest of the world. Derangement of serum magnesium concentration in pregnant women may lead to develop preeclampsia. Therefore there may be a relationship between hypomagnesaemia and preeclampsia. **Aim:** This study was undertaken to assess serum Magnesium and Serum Inorganic Phosphate concentration in hypertensive and normotensive pregnant women in their 3rd trimester of pregnancy. **Methods:** The present study comprised of 100 cases of normotensive pregnant women and 100 cases of clinically established Hypertensive Pregnant women in their 3rd trimester. Serum Magnesium and Phosphate were estimated in Semi-auto analyzer from the study sample. Using Microsoft Excel software performed statistical analysis of the data. **Results:** Mean Magnesium concentration in hypertensive is 2 ± 0.25 meq/l and in normotensive is 2.3 ± 0.35 meq/l. The serum Magnesium concentration was found to be significantly lower ($p < 0.0001$) in hypertensive study participants than in the normotensives participant. **Conclusion:** Magnesium can very well be used as biochemical markers of the new onset hypertensive pregnant women and also can be used in better management of established cases of eclampsia or preeclampsia patients.

Keywords: Magnesium, Phosphorus, Pre-eclampsia, Eclampsia

INTRODUCTION

Hypertensive disorders during pregnancy are one of the main causes of maternal death worldwide. Hypertensive disorders complicating pregnancy are common and form one of the deadly triad, along with hemorrhage and infection that contribute greatly to maternal morbidity and mortality. Hypertensive disorder during the period of pregnancy is a major cause of maternal death in

India and also the rest of the world. Eclampsia is an acute disorder of pregnancy, labour and puerperium, characterized by Preeclampsia with convulsion followed by loss of consciousness with or without oedema. The incidence and prevalence of hypertensive disorders in pregnancy is about 7-10%.¹

During pregnancy estimation of serum magnesium levels may be a useful parameter. In high risk pregnancy women Magnesium supplementation should be considered.² Magnesium is the second most cation found within the cells of body. Serum levels of magnesium range from 1.5 to 2.1 meq/l.³

Magnesium is antagonist to calcium physiologically. During reperfusion, Magnesium attempts to mitigate cellular injury by calcium. So they try to influx, this could explain why magnesium is reduced in the blood.⁴

Magnesium has been shown to be an effective treatment option for the prevention of eclampsia. Its mechanism of action is likely to be both vascular and neurological. Due to antagonist effect to calcium, its effect on vascular smooth muscle to promote relaxation and vasodilation which may lead to lowering of total peripheral vascular resistance. Moreover, Magnesium may have an effect on the cerebral endothelium to limit vasogenic edema by decreasing stress fiber contraction and paracellular permeability via calcium-dependent second messenger systems. In addition, Magnesium may also act centrally to inhibit NMDA

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receptors, providing anticonvulsant activity by increasing the seizure threshold.⁵

There are reduced extracellular calcium and magnesium concentrations in patients with pre-eclampsia and eclampsia. Reduced concentration of magnesium may have a cause and affect relationship with these disorders. These data may therefore be found useful when considering interventional management of preeclampsia and eclampsia using magnesium and calcium supplementation.⁶

The ionized and total magnesium concentration is decreased with increasing gestational age, and during normal pregnancy. There is also evidence that derangement of serum magnesium concentration in women who later develop preeclampsia.⁷

Magnesium is involved in blood pressure regulation through an intracellular inhibition of NO synthase in endothelial cells. Therefore there may be a relationship between hypomagnesaemia and preeclampsia.⁸

Magnesium sulphate use as a neuroprotectant and antivasospastic agent due to its vasoprotective effect during eclampsia.⁹

One study demonstrated that during normal pregnancy there was decrease in phosphate levels but the concentration of Phosphate was increased in Pregnancy induced Hypertension.¹⁰

METHODS

The present study comprised of 100 cases of normotensive pregnant women and 100 cases of clinically established Hypertensive Pregnant women in their 3rd trimester. The clinically established hypertensive 100 cases of pregnant women who were admitted in the antenatal ward in the Department of Obstetrics & Gynaecology, at Assam Medical College & Hospital, Dibrugarh were taken as study case group. The 100 cases of age matched normotensive pregnant women in their 3rd trimester were taken as control group.

So, this study was undertaken to assess serum Magnesium and Serum Inorganic Phosphate concentration and also to correlate any difference found in hypertensive and normotensive women in their 3rd trimester of pregnancy.

Inclusion Criteria

Pregnant women in 3rd trimester (>24 weeks of gestation) suffering from hypertension were taken as 'Hypertensive Study Group.'

The cases for study were composed of already diagnosed cases of hypertension on the basis of following criterion: Blood pressure >140/90 mm of Hg on at least two occasions 6 or more hours apart after 24 weeks of gestation. Only those cases were included from whom informed consent could be taken.

Exclusion Criteria

Patients with history of hypertension, renal disease, collagen vascular disease, diabetes mellitus, severe anaemia, hydatiform mole, multiple pregnancies were excluded from the study.

The venepuncture was done in the cubital fossa. About 2 ml of blood was transferred to sterile empty vials and samples were centrifuged at 5000 rpm for 10 minutes as soon as after formation of the clot. The supernatant clear serum was then pipetted out

using dry piston pipettes with disposable tips. The samples were analysed on the same day. Serum Magnesium and Phosphate were estimated in Semi-auto analyzer from the study sample.

Estimation of Magnesium (Calmagite method)¹¹: Magnesium combines with calmagite in an alkaline medium to form a red coloured complex. Interference of protein and calcium is eliminated by the addition of chelating agent and detergent. Intensity of the colour formed is proportional to the amount of magnesium present in the sample.

Estimation of Phosphorus (Molybdate U.V method)¹²: Phosphate ions in acidic medium react with ammonium molybdate to form a phosphomolybdate complex. This complex has an absorbance in the ultraviolet range and is measured at 340 nm. Intensity of the complex formed is directly proportional to the amount of inorganic phosphorus present in the sample. Phosphorus + Ammonium Molybdate Phosphomolybdate complex.

RESULTS AND OBSERVATIONS

The present study is a randomised case control study. Results were analysed by using unpaired student's t-test.

Table 1 Serum Magnesium concentration in hypertensive and normotensive participants

Comparison	Mean Magnesium (meq/L)	S.D	p-value
Hypertensive	2.0	0.25	<0.0001
Normotensive	2.3	0.35	

Table 1 shows that mean Magnesium level in hypertensive is 2 ± 0.25 meq/l and in normotensive is 2.3 ± 0.35 meq/l. Student t-test revealed very highly significant differences ($p < 0.0001$) in magnesium concentration in between hypertensive and normotensive groups.

Table 2 Serum inorganic Phosphate concentration in hypertensive and normotensive participant

Parameter	Hypertensive		Normotensive		p-value
	Mean (mg/dl)	S.D	Mean (mg/dl)	S.D	
Serum Phosphate	4.0	0.53	3.8	0.97	0.07

Table 2 shows the levels of mean serum Inorganic phosphate in the study participants. The mean serum levels of inorganic Phosphate in hypertensive are 4 ± 0.53 mg/dl and in normotensive is 3.8 ± 0.97 mg/dl. Student t-test revealed that the difference was not significant.

DISCUSSION

In the 100 hypertensive cases which were studied, the maximum number of 49 cases (49%) belonged to the 21-25 years age group. The next highest number of 24 cases (24%) were from the age group of 20 years. The highest number of 73 cases were less than 25 years of age. A study done in Saudi Arabia showed that women at extremes of maternal age, the nulliparous women, and high-parity women are at an increased risk of developing pre-eclampsia.¹³ According to another study maximum incidence of developing pre-eclampsia was in the age group of 15-25 years.¹⁴

In the present study 67 (67%) cases were primigravidas and 33

(33%) cases were multigravidas in the hypertensive study group. Eclampsia is a very common pregnancy associated disorder in our country mostly affecting primigravida of early age group with poor socioeconomic background.¹⁵ According to another study it was found that Pre-eclampsia mainly affects in first pregnancy.¹⁶

The analysis of Magnesium in the study participants, show that serum Magnesium concentration was found to be significantly lower ($p < 0.0001$) in hypertensive study participants (2.0 ± 0.25 meq/l) than to the normotensives (2.3 ± 0.35 meq/l) participants. One study established that Serum Magnesium concentration was found to be significantly lower in pre-eclampsia patients (1.9 ± 0.37 mg/dl vs. 2.29 ± 0.69 mg/dl, $p < 0.01$).¹⁷ The levels of zinc, copper, selenium, manganese and magnesium are significantly altered in pregnant women with pre-eclampsia. In order to get these important elements dietary supplementation or direct replacement therapy of these trace elements is suggested for women with pre-eclampsia (0.5 ± 0.2 meq/l vs 1.0 ± 0.2 meq/l, $p < 0.0001$).¹⁸ Hypomagnesaemia can be said to be one of the etiological factors in pre-eclampsia and eclampsia. Serial estimation of serum magnesium during antenatal period, pre-eclampsia can be predicted and eclampsia can be prevented early.¹⁹

The analysis of serum phosphate in the study participants, show that serum phosphate concentration was found to have statistically no significance. The mean phosphate concentration in hypertensive study participants (4.0 ± 0.53 mg/dl) was higher than in the normotensives (3.8 ± 0.97 mg/dl). Hypophosphaturia are important features of severe preeclampsia and probably are indirectly related to the altered renal function seen in toxemia of pregnancy.²⁰

So we can suggest that a low serum Magnesium level might be linked to explaining the pathogenesis of preeclampsia.

CONCLUSION

The biochemical test performed gives us the information that lowered Magnesium levels in new onset hypertension of pregnancy could be associated with gestational hypertension. Deranged magnesium may cause a imbalance between the vasodilators and vasoconstrictors resulting in hypertension. From the present study it can be concluded that the level of serum Magnesium significantly decreases with new onset hypertension of pregnancy. Therefore, serial estimation of serum Magnesium can very well be used as biochemical markers of the new onset hypertensive pregnant women and also can be used in better management of established cases of eclampsia or preeclampsia patients.

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responsibility for it and (4) All author (s) have reviewed the final version of the above manuscript and approve it for publication.

REFERENCES

1. S Gopalan, S Rathnakumar, V Jain. Mudaliar and Menon's Clinical Obstetrics. 7th ed. India: Orient Blackswan. p. 10-25
2. Bhat S, Waheed A. Serum magnesium levels in preterm labour. Sri Lanka Journal of Obstetrics and Gynaecology 2012;34:37-45.
3. Whitney EN, Cataldo CB, Rolfes SR. Understanding Normal and Clinical Nutrition. 6th ed. USA: Wadsworth. 1996
4. Fawcett WJ, Haxby EJ, Male DA. Magnesium: physiology and pharmacology. Br Journal of Anaesthesia 1999;83:302–25.
5. Anna GE, Marilyn JC. Magnesium Sulfate for the Treatment of Eclampsia. Stroke 2009;40:1168-78.
6. Shahnaz A, Payam K, Fatemeh G, Anahita M. Serum magnesium and calcium ions in patients with severe preeclampsia/eclampsia undergoing magnesium sulphate therapy. J of reproduction and infertility 2007;13(4):190-96
7. Standley CA, Whitty JE, Mason BA, Cotton DB. Serum ionized magnesium levels in normal and preeclamptic gestation. Obstetrics & Gynecol 1997 Jan;89(1):247-50
8. Sanders R, A Konijnenberg, HJ Huijgen, H Wolf, K Boer, GT Sanders. Intracellular and extracellular ionized and total magnesium in Preeclampsia and uncomplicated pregnancy. Clinical Chemistry Laboratory Medicine 1999;37:55-60
9. Macdonald RL, Curry DJ, Aihara Y, Zhang ZD, Jahromi BS, Yassari R. Magnesium and experimental vasospasm. J Neurosurgery 2004 Jan;100(1):106-10.
10. Gertner JM, Coustan DR, Kliger AS, Mallette LE, Ravin N, Broadus AE. Pregnancy as state of physiologic absorptive hypercalciuria. Amer J Med 1986 Sep;81(3).
11. Magnesium kit (Calmagite method) For the Determination of Magnesium in Serum, Plasma and Urine.
12. Phosphorus kit (Molybdate U.V. Method), For the Determination of Inorganic Phosphorus in Serum, Plasma and Urine.
13. Lawoyn TO, Ani F. Epidemiologic aspects of pre-eclampsia in Saudi Arabia. East Africa Med Journal 1996;73:404–8
14. Farnoosh K, Ameneh S, Tahereh B. Survey of Correlation between Preeclampsia and Season & Some of its Risk Factor In Pregnant Women. Omics group journals 2012;2167-0420.
15. Surraya H, Syed M, Ashhad H. Eclampsia and its association with external factors. J Ayub Med Col I Abbottabad 2010;22(3):110-12.
16. Pierreyves R, Gustaaf AD, Thomas CH. Evolutionary Adaptations to Preeclampsia/ Eclampsia in Humans: Low Fecundability Rate, Loss of Oestrus, Prohibitions of Incest and Systematic Polyandry. American J of Reproductive Immunology 2002Feb;47(2):104–12.
17. Vahidrodsari F, Tourabizadeh A, Esmaeli H, Shahabian M. Serum Calcium and Magnesium in Preeclamptic and Normal Pregnancies: A Comparative Study. J Reproduction and Infertility 2008;9(3):256-62.
18. O Akinloye, OJ Oyewale, OO Oguntibeju. Evaluation of trace elements in pregnant women with preeclampsia. African Journal of Biotechnology 2010;9(32):5196-200
19. VP Patil, NA Choudhari. A study of serum magnesium in preeclampsia and eclampsia. Ind J of Clinical Biochemistry 1991July; 6(2):67-75.
20. Pervin V, Calcium and Phosphate Excretion in Preeclampsia. Turk J Med Science 2010;30(2000):39–42.

ORIGINAL PAPER

Efficacy of Mefenamic Acid and Tranexamic Acid in the Management of Dysfunctional Uterine Bleeding

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ABSTRACT

Introduction: Dysfunctional uterine bleeding is one of the most commonly expressed complaints of women at reproductive age leads to anemia and its complications. This study compares the efficacy and acceptability of tranexamic acid with mefenamic acid in treating DUB in order to show the most effective drug.

Materials and methods: During 2010-2011, 60 patients aged 15-49, with DUB who referred to Government maternity hospital, Hanmakonda, Warangal, were randomly divided into 2 thirty-patient groups. The first group received mefenamic acid and the other received tranexamic acid during the first three days of their period for 2 subsequent cycles; following that, their bleeding changes were evaluated. **Results:** Repeated measures anova analysis pointed out that while the decreasing pattern of bleeding for each drug was statistically significant (p value = 0/001), the difference between the decreasing pattern of bleeding resulted from the use of the two drugs was not significant ($p=0/059$). Both groups depicted the same level of satisfaction ($p=0/079$) and no serious complications were reported. **Conclusion:** The efficacy of mefenamic acid and tranexamic acid in treating menorrhagia was the same for both groups.

Keywords: DUB, Mefenamic Acid, Tranexamic Acid

INTRODUCTION

DUB is one of the most commonly expressed complaints for which approximately 5% of 30-49 year old women consult the doctors per year¹ Menorrhagia is defined as complaint of heavy menstrual bleeding over several consecutive cycles. The upper limit of monthly bleeding is 80 ml per cycle, which is 2 standard deviation from the mean (mean menstrual bleeding per cycle is 36 – 52ml).² Menorrhagia happens when there is an increase in menstrual bleeding in multi regular subsequent cycles or the time the bleeding duration rises to more than 7 days.³ Most of

the patients who complain of menorrhagia have no known organic diseases and have normal physical examinations, laboratory tests and imaging (sonography) results.⁴ Menorrhagia, if repeated, causes a decrease in iron reserve and anemia and subsequently, anemia causes psychological and cardiac complications and dysfunction in other organs. So, paying attention to menorrhagia and its treatment can lead to lower morbidity in reproductive aged women. It is worth noticing that most of the iron deficient anemia morbidities are the result of more than 60 ml bleeding per cycle.⁵ The evaluation of the actual bleeding volume is not an easy task because women's evaluation of their own bleeding volume is not reliable. 25% of the women who consider their bleeding level as high had menstrual bleeding less than 35 ml.⁶ The estimation of blood loss volume was done based on the number of pads or tampons soaking per day or per cycle. The patient's estimations of the bleeding volumes are not accurate and reliable because they are not well aware of the normal range of bleeding and their evaluations are inexact.⁷ Although Janssen and colleagues (1995) take low Hb% as a good sign of menorrhagia, there might be normal Hb% patients with menorrhagia. So it is not an ideal screening test.⁸ All of the techniques used for menorrhagia research purposes are difficult and clinically impractical. Examples are Alkaline Haematin Test and Radio Isotope Techniques. So, we need an accurate method of estimating the blood loss which is clinically applicable. In this way treatment without indication is prevented. In this study a

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pictorial chart for the evaluation of menorrhagia was designed. This chart showed high clinical accuracy and its application was feasible. Worldwide use of hormonal therapy is based on the wrong assumption that menorrhagia happens because of imbalance in hormones and an ovulatory cycles, but the fact is most of the women with abnormal bleeding show no evidence of hormonal imbalance and based on some studies 95% have regular ovulatory cycles.⁹

The mechanisms of controlling menstrual bleeding are poorly understood. In the past decades, studies had shown that the increase in endometrial fibrinolysis and an imbalance in prostaglandin caused functional uterine bleeding.¹⁰ Tranexamic acid (250 mg oral capsule) which is a synthetic amino acid was introduced in Sweden as cyclokapron® in 1969 and has since been used in order to decrease menstrual blood loss. Its anti-fibrinolytic effects are achieved by preventing the plasminogen from binding to fibrin filaments and so, it prevents clot dissolution. Mefenamic acid is an NSAID and exerts its anti-prostaglandin effects by inhibiting prostaglandin synthesis, so it balances prostaglandins and decreases menstrual bleeding. Anti-fibrinolytic drugs such as tranexamic acid and anti-prostaglandin drugs such as mefenamic acid are preferred to hormonal drugs the time the contraception is not a goal, as they are used only during menstrual period. Although several studies have evaluated and compared the effects of mefenamic acid and tranexamic acid and compared their effects with each other and on other drugs, so far no specific study has compared the effects of these two drugs on the treatment of menorrhagia in Iranian women to show which one must be preferred as the first choice.

Methodology

This study was a single blind clinical trial that was approved by ethics committee of Kakatiya Medical College, Warangal. During 2011-2012, 60 patients, aged 15-49 suffering from menorrhagia that referred to gynecology clinic of Government Maternity Hospital, Hanmakonda, Warangal were enrolled. Organic causes of menorrhagia were excluded by gynecological examination, sonography, endometrial biopsy and a cervical smear test and patients with a history of renal or hepatic impairment; previous thromboembolic disease, peptic ulcer and coagulation disorders were not enrolled. The entire patient signed the informed consent form. Sixty patients with more than 80 ml menstrual bleeding or those who had experienced menstrual duration for more than 7 days were selected and divided into two groups (a & b) randomly. Group A took 2 tranexamic acid capsules and Group B received 2 mefenamic acid capsules three times a day during the first three days of menstruation. Patients were asked to mark the charts during menses for 2 treatment cycles and one cycle after discontinuation.

RESULTS

Before this study, the mean of menstrual bleeding volume in Group A patients (who received tranexamic acid) was 166.35 ml and in mefenamic acid group (Group B) it was 146.52 ml. After the first and second cycles of treatment, it reduced to 122.12 and 85.77 ml in group A patients and 111.09 and 85 ml in Group B patients. So, the reduction of bleeding volume after the two cycles of treatment was 102.88 ml for Group A and 72.39 ml for Group B.

Although the difference between the two groups was 30 ml, T-test evaluation showed that it was not statistically meaningful. The bleeding volume in the first cycle following the treatment was 63.46 for Group A and 74.13 for Group B.

Repeated measures ANOVA shows that the decline of bleeding volume for each drug was statistically meaningful (p-value = 0/001). Paired T-test pointed out that the decreasing pattern of bleeding volume was statistically meaningful for both drugs (Figure 1).

Then SPSS software (11th edition) was used for data analysis. Ultimately, repeated measure ANOVA and Paired t test was used for comprehensive analysis.

Bleeding duration for tranexamic acid group before and after the treatment was 9.68 and 7.28 days and for mefenamic acid was 7.87 and 6.65 days respectively. This decline is statistically meaningful (p-value < 0/001). The difference between decreased days of bleeding for the two groups was 1/18 days. T-test evaluation pointed out that the difference was not statistically meaningful.

70% of the patients in Group A and 43.3% in Group B were completely satisfied with the treatment. Although 70% of the patients in group A declared that they would choose the drug if the problem recurs, only 50% of Group B patients made such a remark. The difference in the level of satisfaction between the two groups was not significant (p = 0.079). Twenty patients belonging to Group A and 24 patients from Group B reported no complications. In Group A, vertigo was the most common complication which 5 patients suffered and in Group B 3 patients had dyspepsia and 2 patients complained about epigastric pain.

Table 1 Bleeding volume during and after the administration of Mefenamic acid and Tranexamic acid

Treatment		Mean	Std. Deviation
Mefenamic Acid	Bleeding before	146.52	51.133
	First visit bleeding	111.09	56.002
	Second visit bleeding	85.00	32.369
	Bleeding after	74.13	30.993
Tranexamic Acid	Bleeding before	166.35	52.375
	First visit bleeding	122.12	50.974
	Second visit bleeding	85.77	48.347
	Bleeding after	63.46	36.763

Table 2 Comparison of mean difference of bleeding & its duration before & after usage of both drugs

			Mean	Std. Deviation	Pvalue
Mefenamic	Pair	Bleeding before –	72.391	53.553	<0.001
Acid	1	Bleeding after			
	Pair	Duration before –	1.217	1.953	0.007
	2	During after			
	Pair	Bleeding before –	102.885	56.146	<0.001
Tranexamic	1	Bleeding after			
	Pair	Duration before –	2.400	3.096	0.001
Acid	2	During after			

DISCUSSION

It is worth mentioning that tranexamic acid is a synthetically derivative of lysin amino acid which does its anti fibrinolytic effect through reversible block of lysin-attach sites on plasminogen molecules. So the drug inhibits plasminogen to plasmin change and prevents fibrinolysis and lysis of blood clotting.¹¹ Tranexamic acid, only in the form of 250 mg capsule, is available in the market. It is well tolerated and has few side effects such as mild gastrointestinal complications, as reported by this study. Earlier theoretical concerns about thromboembolism due to anti fibrin lytic action of tranexamic acid have been refuted by longitudinal studies. For example Rybo (1991) reported that during 1969 to 1987 the rate of thromboembolism in women suffering from menorrhagia was the same as normal individuals. Prostaglandin imbalance plays an important role in menorrhagia; so mefenamic acid in the form of 250 mg capsule which inhibits prostaglandin synthesis, is used to control menorrhagia. In this study, we observed a good therapeutic effect with tranexamic acid and mefenamic acid. It is in favor of meta-analysis of 7 studies¹² that showed more than 45% reduction in menstrual bleeding volume with tranexamic acid treatment. Sukanyasirnil and colleagues published an article in 2005. They treated 40 menorrhagia women with tranexamic acid capsule 1gm every 8 hours in the first five days of period. This led to 49% decrease in bleeding volume with no change in menstrual duration.¹³ In another study, Tranexamic acid decreased blood loss by 44% compared to mefenamic acid, its effect was more but it was equal to progesterone, especially progesterone IUDs.¹⁴ A similar study was conducted at Shahidsodughi University of Yazd in 2001-2005. Seventy women were treated in the first five days of their menses in 3 subsequent cycles. Thirty patients received Mefenamic acid 500 mg every 8 hours and 39 patients took Tranexamic acid 500 mg every 6 hours. Mefenamic acid decreased bleeding by 20% and Tranexamic acid by 50% and it was concluded that patients with abnormal bleeding should take Tranexamic acid therapy before surgery.¹⁵ Tranexamic acid at a dose higher than the dose routinely used for preventing plasmin formation, inhibits plasmin activity directly.¹⁶ It seems that the higher dose, used in some studies, justifies the better effect of tranexamic acid. This is the effect which was not observed in our study, as both drugs were effective to the same extent. In research studies, the gold standard of measuring menstrual blood loss is

the alkaline haematin test⁵ but it is expensive and time consuming. Methodological limitation of this study is the small sample size. Randomized double blind control trials with large numbers of patients are needed to compare the two drugs with each other and with other drugs.

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Contribution of authors: We declare that the authors named in this article did this work and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

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REFERENCES

1. Royal College of General Practitioners, office of Population Censuses and Surveys, Department of Health and Social Security. Morbidity From General Practice. London. HmsO, 1986.
2. Losiufai L. Modern management of menorrhagia. Hong Kong Practitioner Feb 1996;18(2):12-15.
3. Abbott JA, Hawe J, Garry R. Quality of life should be considered the primary outcome for measuring success of endometrial ablation. J Assoc Gynecol Laparosc 2003;10:491-5.
4. Bonnar J, Sheppard BI. Treatment of menorrhagia during menstruation. Randomized controlled trial of Ethamsylate, Mefenamic Acid and Tranexamic Acid. Bmj 1996;313:579-82.
5. Hall Berg L, Hogdahl A, Nilsson L. Menstrual blood loss. A population study. Variation at different ages and attempts to define normality. Acta Obstet Gynecol Scand 1996;45:320-510.
6. Warner PE, Critchley HO, Lwmsden MA, Campbell Brown M, Douglas A, Murray GD. Menorrhagia. Is the 80ml blood loss criterion useful in management of complaint of menorrhagia? Am J Obstet gynecology 2004;190:1224-9.
7. Berek, J.S. Berek And Novak Gynecology (15ed). 2012.
8. Janssen CA, Scholten PC, Heintz AP. A simple visual assessment technique to discriminate between menorrhagia and normal blood loss- Obstet Gynecol 1995; 85; 977-82.
9. Hagnes PJ, Hedgson H, Anderson. Measurement of menstrual blood loss in patient complaining of menorrhagia. Br J Obstet gynaecol 1977;84:763-8.
10. Bonnar J, Sheppard BI. The haemostatic system and dysfunctional uterine bleeding. Research and Clinical 1983;5:27-36.
11. Wikipedia, The free encyclopedia, Tranexamic acid 2011 [Http://En.Wikipedia.Org/Wiki/Tranexamic Acid](http://En.Wikipedia.Org/Wiki/Tranexamic Acid).
12. Coulter A, Kelland J, Peto V, Rees MC. Treating menorrhagia in primary care. An overview of drug trials and a survey of prescribing practice. Int J Tech Assess Health Care 1995;11:456-71.
13. Sukanya Siril MD, Unnopjaisamram MD. Treatment of idiopathic menorrhagia with tranexamic acid, J Med Assoc Thai 2005; Vol 88.
14. Hall P, MacLachlin N, Thorn N. Control of menorrhagia by the cyclo-oxygenase. 1987;94:554-8.
15. Sekhvat L, Zare F, Karimzade M. Comparison of Mefenamic acid and Tranexamic acid in treatment of hypermenorrhea. Shahid Sedugh University, Department of Obstet and Gynecol yazd 2001-2005.
16. Shahrzad S, Ghazianit. Tranexamic acid- Mefenamic acid. A Comprehensive Text book of Drug Information.

ORIGINAL PAPER

An in-vitro Study Comparing Shear-Peel Band Strength of Untreated and Sandblasted Orthodontic Bands using Conventional Glass Lonomer Cements

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ABSTRACT

Objectives: To compare the shear-peel band strength of untreated (non-sandblasted) and sandblasted orthodontic bands using two conventional glass ionomer cements- Ketac™-Cem Radiopaque (3M, ESPE) and GC Gold Label Type-1 (GC, Corporation). **Methodology:** 50 freshly extracted human mandibular third molars were selected and randomly assigned groups of 25 sample each for specific cements with and without sandblasting. Shear-peel band strength in megapascals were obtained by debanding the cemented bands for each group's specimen using an Instron Universal Testing Machine. Data was analyzed with ANOVA followed by a Tukey test. **Results:** An increase of 72.4% in the retentive strength was observed with sandblasted orthodontic bands cemented with Ketac™ Cem and about 76.2% of retentive strength with sandblasted one cemented with GC type-1 glass ionomer cement in comparison to untreated bands. **Conclusion:** Statistically significant differences were noted between non-sandblasted and sandblasted bands groups. The retentive force was increased to almost three quarter folds with sandblasted bands, irrespective of cement used.

Key words: Orthodontic bands, Glass Ionomer Cements, Shear peel strength, Sand-blast

INTRODUCTION

Glass ionomer cements have become the most commonly used cement for retention of orthodontic bands because of their favorable properties of fluoride release and uptake, microbial inhibition and adhesion to both enamel and metal, low solubility in the oral fluids.

Despite improved retention of bands with glass ionomer cements a few literature (Norris et al;¹ Mirzahi;² Stirrups;³ Durning,⁴ etc.), reveals that failure still occurs in clinical orthodontic practice. The commonest site of bond failure occurs at the band- cement interface.⁵ With such a kind of failure, contemporary research

has focused into clinical performance of surface treatment of orthodontic bands to improve retention,⁶ of which sandblasting has become the preferred one.

AIMS AND OBJECTIVES

The aims and objectives of this in vitro study was to compare the shear-peel band strength between untreated (non-sandblasted) and sandblasted stainless steel orthodontic bands using two types of conventional glass ionomer luting cements- Ketac™- Cem Radiopaque, 3M, ESPE and GC Gold Label Type-1 (GC, Corporation).

METHODS AND MATERIALS

A total of 50 freshly extracted human mandibular third molars with intact enamel surface and free of any signs of demineralization were selected and stored in 10% formalin solution before being used for the study which was conducted in Regional Dental College, Guwahati in 2009. Optimally sized stainless steel molar bands material (Size-180 × 005, 8 Feet, Libral Traders, India) were cut and closely adapted for each tooth. The teeth were randomly assigned and reassigned to four groups consisting of 25 samples in each group.

Group 1: Each tooth was banded using non-sandblasted orthodontic band material with Ketac™- Cem.

Group 2: Each tooth was banded using sandblasted orthodontic band material with Ketac™- Cem.

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Group 3- Each tooth were banded using non-sandblasted orthodontic band material with GC Type 1.

Group 4- Each tooth was banded using sandblasted orthodontic band material with GC Type 1.

Each tooth was completely embedded into a block (25x15x30mm) of self-cure acrylic resin upto the cemento-enamel junction such that the long axis of the tooth lies parallel to the long axis of the acrylic block. In order to facilitate the retention of tooth into the block, a retentive wire of 0.9 mm diameter was passed through a hole of (diameter 1-1.5 mm) drilled near the furcation area of each tooth. An acrylic block of same size was specially designed consisting of two loops of 0.9 mm diameter stainless steel wire of equal lengths. This loops engages through the molar tubes of the band and allowed all forces to be directed parallel to the long axis of the tooth during debanding.

Sandblasting (**Figure 2**) of the band material was performed using a sandblaster (Renfert, Variobasic, Germany) which was held at a distance of 2cm from the blaster nozzle and then spraying with a stream of 99.6% micro aluminium oxide particles (Korox 110, Bego, Germany) against the inner (luting) surface of the metal band under 60-80psi of air pressure, until a uniform frosty appearance on the surface was achieved.

First part of the investigation involved measuring the force in an Instron machine (**Figure 1**) required to deband stainless steel non-sandblasted (NS) bands using Ketac™-Cem and GC Type-1 cements, consisting of 25 samples in each group respectively.

The de-banded teeth were cleaned with a scaler and pumice to remove any remaining cement, followed by rinsing with distilled water and then dried. The tooth was then immediately fitted with the new sandblasted bands.

Second part of the investigation involved measuring the force required to deband stainless steel sandblasted (S) bands using Ketac™-Cem and GC Type-1 cements. Each tooth, which served as the samples for the first part of the study were used again.

Calculation of Shear-Peel Band Strength (SPBS)

After twenty-four hours of cementation, the shear debanding force was applied for each specimen using an Instron Universal Testing Machine (Model 4444) in a tensile mode at a cross head speed of 1mm/min. The shear-peel band strength (SPBS) of cemented band was calculated in Megapascals (MPa) for each of the groups cemented with non-sandblasted and sandblasted bands using the following formula.

$$\text{Shear band strength} = \frac{\text{Breaking load (debanding force in Newton)}}{\text{Surface area of band (mm}^2\text{)}}$$



Figure 1 Debanding done in Instron



Figure 2 Sandblasting Procedure

RESULTS AND OBSERVATION

Descriptive statistics including the mean, standard deviation, minimum and maximum values for the shear-peel band strength between sandblasted and non-sandblasted bands for each group were calculated (Table I). The level of significance was established at $P < 0.05$. Statistical analyses were performed using Windows MS excel Software SPSS (v9.0) Program. A one-way analysis of variance (ANOVA) followed by multiple comparisons Tukey HSD posthoc test was used to determine whether statistically significant differences existed among the various groups.

Table 1 Summary statistics for the mean shear peel band strength of different groups

Groups	n	Breaking load (Force)		Surface area of Band (mm ²)	Retentive strength (MPa)		
		Kilogram	Newton		Mean	SD	Range
1	25	7.147	70.112	174.680	0.402 ^a	0.080	0.238 -0.554
2	25	12.398	121.625	176.111	0.690 ^b	0.221	0.345 -1.228
3	25	18.410	180.603	175.892	1.023 ^c	0.284	0.530 -1.896
4	25	32.565	319.460	176.542	1.803 ^d	0.531	1.038 -2.842
Overall	100	17.845	175.059	175.806	0.991	0.608	0.238 -2.842

Values having different superscripts (a,b,c,d) differ significantly ($p < 0.05$) between groups. n- Number of samples; SD-Standard Deviation.

The order of mean SPBS with their standard deviation from greatest to least is as follows:

GC Type-1 (S) > GC Type-1 (NS) > Ketac™ Cem- (S) > Ketac™ Cem (NS).

or Gr.4 > Gr.3 > Gr.2 > Gr.1

The Tukey test (**Table II**) shows significant differences on comparison of cements between Non-Sandblasted and Sandblasted bands (n=25).

An increase of 72.4% in the retentive strength observed from non-sandblasted to sandblasted orthodontic bands cemented with Ketac™ Cem and about 76.2% of retentive strength with sandblasted GC type-1 glass ionomer cement was observed. This showed superior retention after sandblasting. (**Table III**).

Table 2 Tukey posthoc test for statistical significance between groups

GROUPS	GROUPS			
	1	2	3	4
1	----	0.290*	0.623*	1.403*
2	0.290*	----	0.333*	1.113*
3	0.623*	0.333*	----	0.780*
4	1.403*	1.113*	0.780*	----
* p <0.05 indicates significant values; non comparable entries are designated as ----				

Table 3 The percentage (%) of increase in retentive strength from non-sandblasted to sandblasted samples

Cements	NS-bands	S-bands	% Increase
Ketac™ Cem	0.400	0.690	72.414
GC-Type I	1.023	1.803	76.246
NS-Non-Sandblasted; S- Sandblasted			

DISCUSSION

The present study concurs with the findings of most investigators who demonstrated an increase in band strength after sandblasting stainless steel band material.

The findings of this study are in agreement with those of Seeholzer H, Dasch W⁷ who compared groups of orthodontic patients banded with either copper cement or conventional glass ionomer cement. The study showed a considerable increase (30%) in adhesion when the inner surfaces of the bands were sandblasted.

The present study also supports the findings of Millet, McCabe and Gordon⁸. The authors recorded an increase of 27% in bond strength after sandblasting the bands cemented with glass ionomer cement.

Wood and Paleczny⁵ conducted an invitro investigation on twenty extracted human mandibular third molars to evaluate the force required to cause debanding of untreated and sandblasted bands using three different types of cements-zinc phosphate, polycarboxylate and glass ionomer cements. The same bands were then sandblasted and reused. They observed that there was a phenomenal increase of almost 100% in band retention strength after sandblasting the inner surface of the bands.

Miller and Zernik⁶ also did a invitro study on bovine maxillary incisors and found that the mean shear strengths was improved on sandblasting with stainless steel discs cemented with glass ionomer cement.

Aggarwal et al⁹ compared the shear-peel band strength of 5 orthodontic cements using both factory and in-office micro-etched bands. In this study, the significantly superior band retention of factory-etched bands over the sandblasted bands was found.

Hodges et al¹⁰ Millet et al¹¹ were also with the opinion that there was improved band retention with sandblasted/ micro-etched bands.

Although this study established greater shear peel band strength with sandblasted band material, in order to come to a decisive conclusion, further research has to be done with greater number of samples. Bands are subjected to stresses like torsion, tensile or shear or a combination of all of these, and it is difficult to

precisely measure and quantify these forces. Even there are no validated devices to measure the actual debanding forces in vivo. Moreover the cleaning procedure to remove cement remnant are always accompanied by degree of enamel loss.

CONCLUSION

Current research has shown that sandblasting is a preferred method of surface treatment of metals to improve band strength. The sandblasting process enhances the retentive nature of the stainless steel orthodontic bands by increasing its inner surface area and thinning the oxide layer of the stainless steel band.

The following conclusions can be drawn:

1. The mean retentive force increased to almost three quarter folds on sandblasting the inner surface of the orthodontic bands materials.
2. GC Type-1 demonstrated highly significant ($P < 0.001$) retentive strength ability compared to KetaTM Cem Radiopaque Glass ionomer cement.

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REFERENCES

1. Norris DS, McInnes Ledoux, Weinberg. Retention of orthodontic bands with new fluoride releasing cements. AJO 1986;89:206-211.
2. Mirzahi E. Glass Ionomer Cements in orthodontics an update. Am J Orthod Dentofacial Orthop 1988;93:505-507.
3. Stirrups DR A Comparative clinical trial of a Glass Ionomer and a Zinc phosphate cement for securing orthodontic bands. British Journal of Orthodontics 1991;18:15-20.
4. Durning P, McCabe JF and Gordon PH. A laboratory investigation into cements used to retain orthodontic bands. British Journal of Orthodontics 1994;21:27-32.
5. Wood DP, Paleczny GJ, Johnson L. The effect of sandblasting on the retention of orthodontic bands. Angle Orthod 1996;66(3):207-214.
6. Miller S, Zernik J. Sandblasting of bands to increase bond strength. JCO 1996;4:217-222.
7. Seeholzer H, Dasch W. Banding with a Glass Ionomer Cement JCO 1988;XXII(3):165-169.
8. Millet DT, McMable JF Bennett TG, Gordon PH. The effect of sandblasting on the retention of first molar orthodontic bands cemented with Glass Ionomer Cement. BJO 1995;22:161-9.
9. Aggarwal Manish, Foley Timothy F and Douglas. A Comparison of Shear-Peel Band Strengths of 5 Orthodontic Cements. Angle Orthod 2000;70:308–316.
10. Hodges SJ, Gilthroe MS and Hunt NP. The effect of micro-etching on the retention of orthodontic molars bands: a clinical trial. European Journal of Orthodontics 2001;23:91–97.
11. Millett DT, Cummings A, Letters S, Roger E and Love J. Resin-modified glass ionomer, modified composite or conventional glass ionomer for band cementation? An in vitro evaluation. European Journal of Orthodontics 2003;25:609–614.

ORIGINAL PAPER

Clinical study of cardiovascular complications in chronic kidney disease patients with special reference to echocardiography

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ABSTRACT

Background: Cardiovascular abnormalities are commonly encountered in patients with chronic kidney disease (CKD) or end stage renal disease (ESRD) and these include left ventricular hypertrophy (LVH), left ventricular dilatation, and left ventricular systolic and diastolic dysfunction. Uremic cardiomyopathy is thought to be the pathological cardiac hypertrophy, indicating the influence of impaired renal function on the myocardium. Cardiovascular complications lead in all causes of mortality among patients with CKD, accounting for approximately 50% of deaths. **Method:** It was a hospital based study conducted from March 2014 to March 2015 in Guwahati Medical College where CKD patients were evaluated for presence of any cardiovascular morbidity. **Results:** Cardiomegaly on chest x-ray was present in 64% of the patients. Electrocardiography and 2D echocardiography of patients revealed LVH in 76% and 84% of patients. Left ventricular systolic dysfunction (LVSD) was found in 52 % of patient of which 34 % had mild dysfunction (LVEF= 45% -54%) and 18 % had moderate dysfunction (LVEF= 35% -44%). Diastolic dysfunction was found in 54 % of patient. **Conclusion:** Cardiovascular complications are common in patients with chronic kidney disease, which is an important cause of morbidity and mortality in these patients and the most common morbidity found in this study was left ventricular hypertrophy.

Keywords: Chronic kidney disease, cardiovascular complications, echocardiography

INTRODUCTION

Chronic kidney disease (CKD) encompasses a spectrum of different pathophysiologic processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate (GFR). Cardiovascular abnormalities commonly encountered in patients with CKD or ESRD include left ventricular

hypertrophy (LVH), left ventricular dilatation, and left ventricular systolic and diastolic dysfunction.¹ Uremic Cardiomyopathy is thought to be the pathological cardiac hypertrophy, indicating the influence of impaired renal function on the myocardium. It is the result of pressure overload, volume overload, and the uremic state itself. LV pressure overload occurs frequently from hypertension and arteriosclerosis, and occasionally from aortic stenosis; LV volume overload occurs as a result of the presence of an arteriovenous fistula, anemia, and hypervolemia. Cardiovascular complications are a major cause of morbidity and mortality in CKD patients, accounting for approximately 50% of deaths.²

Aims: (i) To study the clinical presentation with special reference to cardiovascular system in patients with chronic kidney disease and (ii) To study the prevalence of various cardiovascular abnormalities in chronic kidney disease patients using echocardiography.

MATERIALS AND METHODS

The study was conducted in patients with chronic kidney disease admitted in Department of Nephrology and Medicine, Gauhati Medical College Hospital, Guwahati during the period March 2014 to March 2015. CKD patients are divided into 5 stages according to GFR as shown in **Table 1**. CKD stage 3 to stage 5 were included in the study

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Table 1 Stages of Chronic kidney disease

Stages	GFR (ml/min)
1	≥ 90
2	60- 89
3	30- 59
4	15- 29
5	< 15

Exclusion criteria:

- 1) Patients who were known valvular heart disease, coronary heart disease, diabetes mellitus, hyper/hypothyroidism.
- 2) Patients who were known hypertensive for years before the onset of CKD.
- 3) Patients who underwent dialysis after admission.
- 4) Patients above 50 years of age.
- 5) Patients who were alcoholics.

After admission, each patient was subjected to a thorough history and clinical examination with special interest to the cardiovascular system, necessary blood investigations, chest X ray, electrocardiography (ECG) and 2D Echocardiography.

RESULTS

The study included a total of 50 CKD patients of which 5 (10%) belonged to stage 3 CKD, 29 (58%) belonged to stage 4 and 16 (32%) belonged to stage 5 CKD. Chronic glomerulonephritis (52%) was the most common cause of CKD in the present study, followed by chronic interstitial nephritis (16%), obstructive uropathy (10%), systemic lupus erythematosis (6%) and etiology was unknown in 8 (16%) patients. Of these 50 patients, 40(80%) were males and 10 (20%) were females. The age and sex distribution of the patients are shown in **Table 2**.

Table 2 Age-sex distribution of patients

Age group (years)	Male	Female
< 20	5	2
21- 30	13	3
31- 40	16	5
41- 50	6	0
Total	40	10

Regarding the symptoms, easy fatigability was found in 100% of patients, followed by dyspnea in 68 %, chest pain in 18 %, palpitation in 14 % and syncope in 8 % of patients. The symptoms of the patients are shown in **Table 3**.

Table 3 Showing the symptoms

Symptoms	Present	
	Numbers	Percentage (%)
Easy fatigability	50	100
Dyspnea	34	68
Chest pain	9	18
Palpitations	7	14
Syncope	4	8

The various examination findings in the patients including the signs in general physical examination, signs in clinical examination and auscultatory findings are shown in **Table 4**, **Table 5** and **Table 6** respectively.

Table 4 Showing the signs on clinical examination (General physical examination)

Symptoms	Present	
	Numbers	Percentage (%)
Pallor	50	100
Pedal edema	26	52
Elevated JVP	17	34
Hypertension	40	80
Tachycardia	8	16
Irregular pulse	7	14

Table 5 Signs on clinical examination (Systemic examination)

Symptoms	Present	
	Numbers	Percentage (%)
Apex shifted	5	10
Muffled heart sounds	8	16
Murmurs	12	24
Pericardial rub	1	2
Tender hepatomegaly	1	2
Anasarca (ascites± pleural effusion± pedal edema)	7	14
Pulmonary edema	18	36

Table 6 Auscultatory findings in CKD patients

Auscultatory findings	Numbers	Percentage (%)
Muffled heart sounds	8	16
Haemic murmur	5	10
ESM-AA	4	8
PSM-MA	3	6
Pericardial rub	1	2

Chest X ray and ECG were done in all the patients. In chest x ray (PA view), 64% of patients had cardiomegaly (cardiothoracic index >0.5). Pulmonary edema and pleural effusion was present in 8 % and 12 % of patients respectively. The various electrocardiographic (ECG) findings of the patients are shown in **Table 7**

Table 7 Electrocardiography (ECG) changes in CKD patients

Findings		No of patients (n=50)	Percentage (%)
Rhythm	Sinus	45	90
	Non sinus	5	10
Rate	Tachycardia	8	16
	Bradycardia	0	0

QRS axis	Left	10	20
	Right	0	0
Atrial enlargement	Left	10	20
	Right	0	0
	Both	0	0
Ventricular hypertrophy	Left	38	76
	Right	0	0
	Both	0	0
Conduction defect	1p AV block	2	4
	2p AV block	1	2
	LBBB	0	0
	RBBB	18	36
	CHB	10	20
	IVCD	0	0
Arrhythmia	AF	2	4
	APC	8	16
	VPC	18	36
	Sinus		
	tachycardia	8	16
	Others	0	0
Poor R wave progression		9	18
Non specific ST-T changes		17	34

IVCD (intraventricular conduction defect), AF (atrial fibrillation), APC (atrial premature contraction), VPC (ventricular premature contraction)]

On 2D echocardiography, LVH was found in 84 % of the patients. Left ventricular systolic dysfunction (LVSD) was found in 52 % of patient of which 34 % had mild dysfunction (LVEF= 45% - 54%) and 18 % had moderate dysfunction (LVEF= 35% - 44%). Diastolic dysfunction (DD) was found in 54 % of patient of which 36 % had grade 1 dysfunction and 18 % had grade 2 dysfunction. Pericardial effusion was found in 20 % and regional wall motion abnormalities (RWMA) in 30 % of patients. Valvular heart disease was detected in 32 % of patients of which mitral regurgitation was found in 22% of patients and aortic stenosis in 10 % of patients. The echocardiographic findings of the patients are shown in **Table 8 and Figure 1**.

Table 8 Echocardiographic findings of the patients

Echocardiographic Findings	Number	Percentage (%)
LVH	42	84
LVSD	26	52
DD	27	54
Pericardial effusion	10	20
RWMA	15	30
Valvular heart disease	16	32

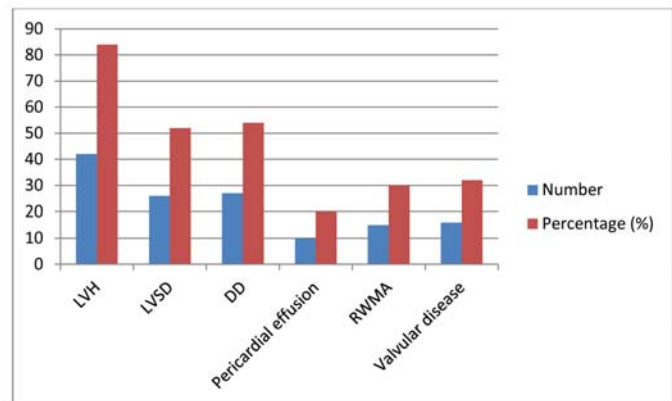


Figure 1 Showing echocardiographic findings of the patients

The Clinico–ECG–Echocardiographic correlation regarding LVH is shown in **Table 9**.

Table 9 Showing Clinico–ECG–Echocardiographic correlation regarding LVH

	No	Percentage (%)
Apex shifted	5	10
Cardiomegaly in CXR	32	64
LVH in ECG	38	76
LVH in 2D ECHO	84	84

DISCUSSION

All adult patients who fulfilled the inclusion and exclusion criteria were included in the study. A total of 50 cases were taken of which 40 (80%) were males and 10 (20%) were females.

Easy fatigability was the most common symptom which was present in all the patients. Chest pain was found in 9 patients (18%). Foley RN et al³ in their study found angina pectoris in 19% of the CKD patients they studied which is comparable to our study (19% vs. 18%). History of palpitations was obtained from 7 (14%) patients. Foley RN et al³ in their study found palpitations (dysrhythmias) in 7% of the CKD patients they studied (7% vs. 14%).

Hypertension was present in 80% of patients. Ulasi LL et al⁴ in their cross sectional study (involving CKD patients) found hypertension in 85.3% of the patients which is comparable to the present study which found hypertension in 80% of the patients (85.3% vs. 80%). Levin Adeera⁵ in their study also found prevalence of hypertension and LVH in 87-90% of the patients.

Left ventricular hypertrophy (LVH) by electrocardiography (ECG) was detected in 38 out of 50 patients (76%). Stewart GA et al⁶ in their study found LVH in more than 80% of the study group concentric type being dominant. Costa Fde A et al in their study also found LVH in 83% of CKD patients.⁷

Other electrocardiographic abnormalities also detected in the study were left axis deviation (20%), left atrial enlargement (20%), 1p degree AV block (4%), 2p degree AV block (2%), LBBB (36%), RBBB (20%), VPCs (36%), poor R wave progression (18%). The ECG changes were a decrease in T wave amplitude and increase in Tmax time (all patients), an increase of QRS amplitude (61% of

patients), shortened or prolonged QTc interval (61%) and ischemic-like ST-T changes (22% and 39%, respectively). Potentially clinically significant arrhythmias occurred in 12 patients (31%) of which 8 were supraventricular, 3 were combined ventricular and supraventricular and 1 was pure ventricular as studied by Shapira OM et al.⁸ Non specific (ischemic like) ST-T changes were seen in 34%. Shapira OM et al⁸ in their study also found non specific ST-T changes in 22 to 39 % of the patients.

Findings of present study and Stewart GA et al is comparable.⁶ Difference between our study and Costa Fde A et al,⁷ Shapira OM et al could be because of the difference in sample size.⁸

On 2D echocardiography, LVH was found in 84% of the patients. Ulasi LL et al in their cross sectional study (involving CKD patients) found LVH in 95.5% of the cases and 6.7% of controls (95.5% vs. 84%).⁴ Levin Adeera⁵ in their study found LVH to be present in 75% of the patients prior to hemodialysis (75% vs. 84%). The variation could be due to difference in the sample size and its composition, selection criteria.

Pericardial effusion was present in 20% of patients in the present study which is comparable to Chinwuba Ijoma et al who found it to be in 15.9%.⁹

Regional wall motion abnormalities suggestive of coronary artery disease (CAD) were found to be in 15 patients (30%) by 2D echo. Kamalesh B et al.¹⁰ in their study found the prevalence of CAD (wall motion abnormalities) in 38% of CKD patients (almost double of that present in non CKD patients). Levin Adeera⁵ in his study found IHD/angina to be present in 35% of CKD patients.¹⁰⁸ In, NEOERICA study,¹¹ the prevalence of ischaemic heart disease (IHD) in stage 3 to stage 5 was found to be 25%. The difference in prevalence of angina/IHD/CAD could be explained by the different sample size, duration of study and criteria used to select the patients, presence of other comorbidities.

In our study, diastolic dysfunction (DD) was seen in 54% of patients whereas left ventricular systolic dysfunction (LVSD) was seen in 52% of patients. LV diastolic dysfunction was more common in all stages of CKD.¹² In the study conducted on ESRD patients by Parfrey PS et al had systolic dysfunction was found in 16% of patients.¹³ This difference with the present study could be because of varying sample size and baseline characteristics.

CONCLUSION

Cardiovascular complications are common in patients with chronic kidney disease, which is an important cause of morbidity and mortality in these patients. The most common morbidity found in this study was left ventricular hypertrophy. Proper cardiac evaluation should be done in all CKD patients so that early intervention can be initiated to decrease the incidence of complications.

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REFERENCES

1. Jardine AG, McLaughlin K. Cardiovascular complications of renal disease. *Heart* 2001;86:459–466.
2. Nolan CR. Strategies for improving long-term survival in patients with ESRD. *J Am Soc Nephrol* 2005;16:S120–S127.
3. Foley RN, Parfrey PS, Harnett JD, Kent GM, Martin CJ, Murray DC et al. Clinical and echocardiographic disease in patients starting end-stage renal disease therapy. *Kidney Int* 1995 Jan;47(1):186-92.
4. Ulasi LL, Arodiwe EB, Ijoma CK. Left ventricular hypertrophy in African Black patients with chronic renal failure at first evaluation. *Ethn Dis* 2006 Autumn; 16(4):859-64.
5. Levin Adeera. Clinical epidemiology of cardiovascular disease in chronic kidney disease prior to dialysis. *Semin Dial* 2003 Mar-Apr;16(2):101-5
6. Stewart GA, Gansevoort RT, Mark PB, Rooney E, McDonagh TA, Dargie HJ et al. Electrocardiographic abnormalities and uremic cardiomyopathy. *Kidney Int* 2005 Jan;67(1):217-26.
7. Costa Fde A, Rivera IR, Vasconcelos ML, Costa AF, Póvoa RM, Bombig MT et al. Electrocardiography in the diagnosis of ventricular hypertrophy in patients with chronic renal disease. [Article in English, Portuguese, Spanish]. *Arq Bras Cardiol* 2009 Oct;93(4):380-6.
8. Shapira OM, Bar-Khayim Y. ECG changes and cardiac arrhythmias in chronic renal failure patients on hemodialysis. *J Electrocardiol* 1992 Oct;25(4):273-9.
9. Chinwuba Ijoma, Ejikeme Arodiwe, Ifeoma Ulasi, Benedict Anisiuba. Pericardial Thickening is a Major Cardiac Complication in Patients with Chronic Kidney Disease at First Presentation. *International Journal of Nephrology & Urology* 2010;2(3):438-446.
10. Kamalesh M, Campbell S, Chong CK, Gipson A, Patel N, Ng C et al. Metabolic syndrome attenuates effect of chronic kidney disease on prevalence of coronary disease in men referred for stress imaging study. *Clin Nephrol* 2009 Mar;71(3):255-62.
11. de Lusignan, Chan T, Stevens P, O'Donoghue D, Hague N, Dzregah B, et al. Identifying patients with chronic kidney disease from general practice computer records. *Fam Pract* 2005;22(3):234–241.
12. Takenori Otsuka, Makoto Suzuki, Hisao Yoshikawa, Kaoru Sugi. Ventricular diastolic dysfunction in the early stage of chronic kidney disease. *Journal of Cardiology* 2009;54(2):199–204.
13. Parfrey PS, Foley RN, Harnett JD, Kent GM, Murray DC, Barre PE. Outcome and risk factors for left ventricular disorders in chronic uremia. *Nephrol Dial Transplant* 1996 Jul;11(7):1277-85.

ORIGINAL PAPER

Cadaveric study on the branching pattern of profunda femoris artery and its circumflex branches

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ABSTRACT

Introduction: Variation of the profunda femoris artery and its branches are not uncommon. Since profunda femoris artery (PFA) is the chief artery supplying the thigh; knowledge of its variations is very important for any surgical procedure of the thigh. **Materials and method:** 24 lower limbs were dissected and the following points were noted. The relation of profunda femoris artery at its origin from the femoral artery was noted. The distance of the site of the origin of the profunda femoris from the midpoint of the inguinal ligament was measured. Also the sites of origin of the lateral circumflex femoral artery (LCFA) and medial circumflex femoral artery (MCFA) were noted and the distance of site of origin of each of them from the origin of profunda femoris artery were also measured. **Results:** Majority of profunda femoris artery arise from a posterolateral aspect of femoral artery at a distance of 21-41mm away from the midpoint of inguinal ligament. Whereas majority of lateral circumflex femoral artery arise from the lateral aspect of profunda femoris artery at a distance of 11-40mm away from the origin of profunda femoris. Majority medial circumflex femoral artery arises from the medial aspect of femoral artery at a distance of 11-30mm away from origin of the profunda femoris artery. **Conclusion:** Knowledge of variations in the origin of these arteries is very important for surgeons while performing surgical procedures in the thigh to avoid complications.

Keywords: Medial and lateral circumflex artery, inguinal ligament, variations

INTRODUCTION

The profunda femoris artery is the main artery supply of the thigh arising from the lateral side of the femoral artery about 3-4 cm distal to the inguinal ligament. Lateral and medial circumflex femoral arteries, arise from the profunda femoris artery from the lateral and medial side respectively.¹ The profunda femoris artery

is frequently incorporated in the vascular reconstructive surgery.² The knowledge of variations in height of origin of profunda femoris artery and its branches is of great significance for preventing flap necrosis, particularly tensor fascia latae, when used in plastic and reconstructive surgery.³ Gautier et al⁴ stated that the precise knowledge of anatomy of medial circumflex femoral artery is essential while performing both trochanteric and intertrochanteric osteotomies and is also helpful to avoid iatrogenic vascular necrosis of the head of the femur in reconstructive surgery of hip and fixation of acetabular fractures through the posterior approach.

MATERIAL AND METHODS

24 lower limbs from 12 cadavers (7 male and 5 female) were dissected in the department of Anatomy RIMS Manipur in collaboration with the department of Anatomy NEIGRIHMS, Shillong. Femoral artery and its branches were identified and traced by using conventional method of dissection. The relation of profunda femoris artery (PFA) at its origin to the femoral artery was noted. The distance of the site of the origin of the profunda femoris from the midpoint of the inguinal ligament was measured. Also the sites of origin of the lateral circumflex femoral artery

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(LCFA) and medial circumflex femoral artery (MCFA) were noted and the distance of site of origin of each of them from the origin of profunda femoris artery were measured.

OBSERVATION AND RESULT

Distance of origin of profunda femoris from the midpoint of inguinal ligament: Out of 24 femoral artery, 66.6% of profunda femoris artery arise at a distance of 21-41mm away from the inguinal ligament, whereas 39.1% arise at a distance of 41-60mm and only 4.1% in the present study it arise at a distance of 10-20mm away from inguinal ligament (**Table 1**).

Table 1 Distance of origin of Profunda Femoris from the midpoint of inguinal ligament

Range (in mm)	Right	Left	Total	% age
10-20	1	-	1	4.1
21-30	3	5	8	33.3
31-40	4	4	8	33.3
41-50	3	1	4	16.6
51-60	1	2	3	12.5

Site of origin of profunda femoris from femoral artery: 50% of the profunda femoris artery arises from the posterolateral part (**Figure 1, 2, 3**), 29.1% from posterior whereas 20.8% arise from the lateral aspect (**Table 2**).

Table 2 Site of origin of profunda femoris from femoral artery

Site	Right	Left	total	% age
Posterolateral	7	5	12	50
Lateral	2	3	5	20.8
Posterior	3	4	7	29.1

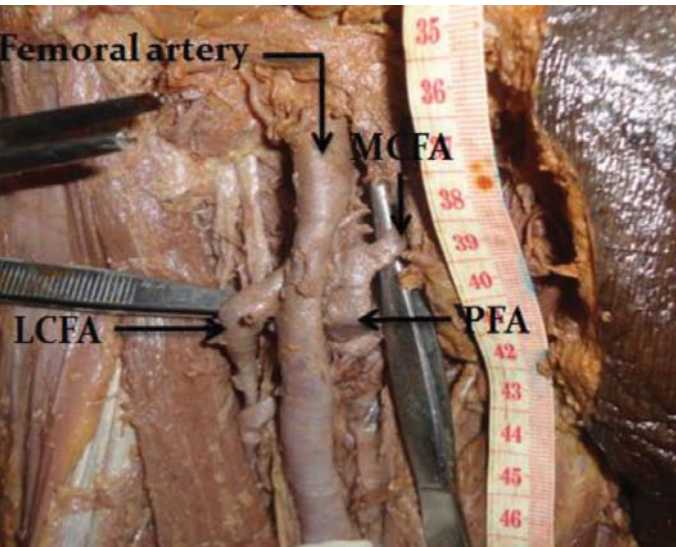


Figure 1 Normal branching pattern showing both medial and lateral circumflex femoral artery originating from profunda femoris artery

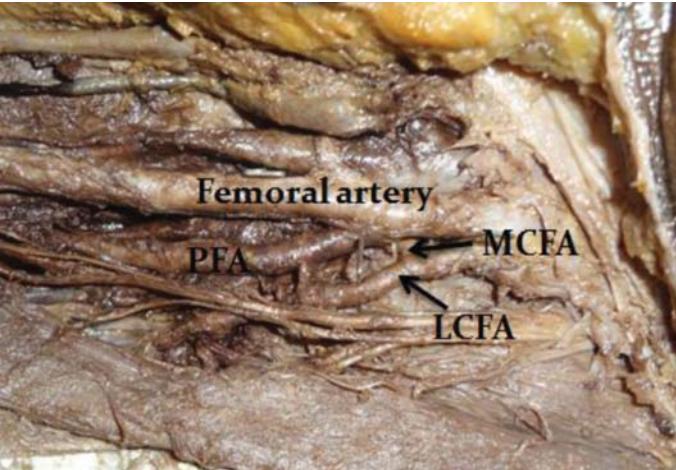


Figure 2 Showing common trunk of origin for both the circumflex artery which itself arise directly from femoral artery



Figure 3 Showing Lateral circumflex femoral artery (LCFA) originating directly from the lateral aspect of femoral artery

Table 3 Distance of origin of lateral circumflex femoral artery from origin of the Profunda Femoris artery

Range (in mm)	Right	Left	Total	% age
0-10	2	1	3	12.5
11-20	3	4	7	29.1
21-30	3	1	4	16.6
31-40	3	2	5	20.8

Origin of the lateral circumflex femoral artery (Table 4): 79.2% arise from the lateral aspect of profunda femoris artery and 20.8% arise directly from the femoral artery proximal to the origin of profunda femoris artery (**Figure 1, 2, 3**).

Table 4 Origin of the lateral circumflex femoral artery

Origin (From)	Right	Left	Total	% age
PFA on lateral aspect	11	8	19	79.1
Femoral artery superior to the origin of PFA	1	4	5	20.8

Distance of origin of medial circumflex femoral artery from origin of the profunda femoris artery: 70.7% of it arises at a distance of 11-30mm away from origin of the profunda femoris artery, 20.8% at a distance of 0-10mm, and only 4.1% at a distance between 31-40mm (**Table 5**).

Table 5 Distance of origin of medial circumflex femoral artery from origin of the Profunda Femoris artery

Range(in mm)	Right	Left	Total	%age
0-10	2	3	5	20.8
11-20	4	6	10	41.6
21-30	5	2	7	29.1
31-40	1	-	1	4.1

Origin of medial circumflex femoral artery (Table 6): 95.6% arise from medial aspect whereas 4.1% arise from the lateral circumflex femoral artery (**Figure 2**) on its medial aspect (as common trunk).

Table 6 Origin of medial circumflex femoral artery

Origin (From)	Right	Left	Total	%age
PFA on medial aspect	12	11	23	95.6
LCFA from medial aspect	-	1	1	4.1

DISCUSSION

The profunda femoris artery (deep femoral artery) is a large branch that arises laterally from the femoral artery about 3.5 cm distal to the inguinal ligament.¹ Brijesh RA, Sujatha K, T Fatima⁵ stated that the average distance of PFA from inguinal ligament is 30-40 mm. The term “high origin” of profunda femoris artery is used when it originates from the femoral artery at a distance of 0-10mm away from the inguinal ligament. The advantage of high origin (0-10mm) of PFA is that it can be used for catheterization and for further investigation of any arterial system of the body.⁶ In the present study we have found that majority of it arise at a distance of 21-41mm away from the inguinal ligament and we did not encounter even a single case of high origin. So the finding of the present study is more or less similar with the findings of above mentioned authors.

The most common site of origin of PFA is from posterolateral aspect of femoral artery.^{1,7} But according to Siriporn et al,⁸ and Samarawickrama et al,⁹ the most common site of origin of PFA is from posterior aspect, i.e. 44.64% & 46% respectively. In our study we found that majority of it arise from the posterolateral aspect of femoral artery whereas only 29.1% of it takes origin from posterior aspect.

Umez M et al,¹⁰ stated that 77.3% of the LCFA arise from the PFA and 22.7% arise from the femoral artery. Fukuda H et al,¹¹ also found that majority of LCFA arise from PFA. Baptish M,¹² reported its origin from femoral artery. Whereas Tanyeli E,¹³ reported the origin of LCFA from femoral artery inferior to the origin of PFA. In our study we have found that 79.2% of LCFA arise from the lateral aspect of profunda femoris artery and only 20.8% of it takes origin directly from the femoral artery proximal to the origin of profunda femoris artery

In most cases LCFA arise from the PFA at a distance in between 21-30mm.⁶ In our study majority of LCFA i.e. 70.7% arise at a

distance of 11-30mm away from origin of the profunda femoris artery, whereas 20.8% of it arise at a distance of 0-10mm, and only 4.1% of LCFA arise at a distance 31-40mm away from the origin of PFA.

Daksha Dexit,⁶ reported that the distance of origin of MCFA from the origin of PFA was mostly 0-10 mm. In our study it is mostly arise at a distance of 11-30 mm away from origin of the profunda femoris artery. Present study shows that MCFA mostly originates from the medial aspect of the PFA in both sides. This is comparable to the finding of Daksha dexit,⁶ Lipshutz BB.¹⁴ Clarke.¹⁵ Evans CA et al,¹⁶ reported that MCFA & LCFA arising by a common trunk from the femoral artery. In present study we found that only 4.1% of MCFA arise from the lateral circumflex femoral artery on its medial aspect as common trunk which itself arise from the femoral artery.

CONCLUSION

Variations in the origin of profunda femoris artery and its circumflex branches are very commonly encountered. Knowledge of variations in the origin of these arteries is very important for surgeons while performing surgical procedures in the thigh to avoid complications.

REFERENCES

1. Standing S. Pelvic girdle, gluteal region and hip joint, profunda femoris artery. In: Grey's Anatomy, the anatomical basis of clinical practice. 40th ed. Spain: Churchill Livingstone Elsevier; 2008. p. 1379-80.
2. Siddharth P, Smith NL, Mason RA, Giron F. Variational anatomy of the deep femoral artery. *Anat Rec* 1985;212(2):206-209.
3. Vuksanovic BA, stefanivic N, pavlovic S, Duraskovic R, Randelovic J. Analysis of deep femoral artery origin variances on fetal material. *Factauniversitatis: medicine and Biology* 2007;112-116.
4. Gautier E, Gang K, Krugel N, Gill T, Ganz R. Anatomy of the medial femoral circumflex artery and its surgical implications. *J Bone Joint Surg Br* 2000;82(5):679-683.
5. Brijesh RA, Sujatha K, T. Fatima. Morphological study of origin of profunda femoris artery in human cadavers. *Int J Anat Res* 2015;3(3):1376-80
6. Dixit DP, Metha LA, Kothari ML. Variations in the course of profunda femoris. *J Anat Soc India* 2001;50(1):6-7.
7. Hollinshead: Buttock, hip joint, and thigh, profunda femoris artery. In: *Anatomy for surgeons: Vol.3. The back and limbs*. 2nd ed. New York: Happer & Row; 1969. p. 725-30.
8. Siriporn T, Rungruang T, Voraphattropas C. The origin of profunda femoris artery in Thais. *Siriraj Med J* 2012;64:34-36.
9. Samarawickrama MB, Nanayakkara BG, Wimalagunaratna KWR, NishantaDG, WalwageUB. Branching pattern of femoral artery at the femoral triangle: A cadaver study. *Galle Medical journal* 2009;14:1.
10. Uzel M, Tanyeli E, Yildirim. Anatomical study of the origin of lateral circumflex femoral artery in Turkish population. *Folia Morphol (Warsz)* 2008;67(4):226-230.
11. Fukuda H, Ashida M, Ishii R, Abe S, Ibukuro K. Anatomical variants of the lateral femoral circumflex artery: an angiographic study. *Surg Radiol Anat* 2005;27(3):269-264.
12. Baptist M, Sultana F, Hussain T. Anatomical variation of the origin of profunda femoris artery, its branches and diameter of the femoral artery. *Professional Med J* 2007;14(3):523-527.
13. Tanyeli E, Yildirim M, Uzel M, Ural F. Deep femoral artery with 4 variations- a case report. *Surg Radiol Anat* 2006;28(2):211-213.
14. Lipchut BB. Study on the blood vascular tree, 1, A complete study of the femoral artery. *Anat Rec* 1916;361-370.
15. Clarke SM, Colborn GL. The medial femoral circumflex artery; its clinical anatomy and nomenclature. *Clin Anat* 1993;6(2):94-105.
16. Evans CA, Smith KS, Jarolim L. Observation of two uncommon variations of proximal branches of femoral artery. *Faseb J* 2007;776,11.

ORIGINAL PAPER

Profile of Adverse Drug Reaction in Patients with Renal Disorders

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ABSTRACT

Introduction: Lot of drugs cause renal dysfunctions. As renal patients are prescribed medications with utmost care and attention, and with dose modifications according to GFR, adverse drug reactions in renal patients are expected to be very low. **Aim:** To find out the incidence of adverse drug reaction (ADR), to ascertain the association of the offending drugs with the type of ADR, and to assess the severity of ADR, in indoor and outdoor renal patients. **Methods:** This is prospective observational case control study, which was conducted in 850 patients, who had either attended the Nephrology dept. OPD or were admitted in the Nephrology ward of Guwahati Medical College hospital with various renal disease, from January to June 2012. **Results:** Out of the 850 patients, 72 (8.4%) patients were found to have one or more ADR, comprising of total 89 episode of ADR. Out of these male were 40 and female were 32 in number. Commonest age group was 18- 60 years of age. Commonest ADR was Moon face (18.6%), followed by Allergic reactions (10.4%). In the causality assessment scale: most of the ADR were highly probable for offending drugs (65%). Regarding severity, most of the patients had mild ADR (51.6%), latent in onset, and only 12.3 % were preventable. **Conclusion:** Even after careful monitoring, ADR is not uncommon in renal patient and most of them are not preventable.

Keywords: ADR: Adverse drug reaction. GFR: Glomerular filtration rate

INTRODUCTION

As per World Health Organization definition (WHO), “an adverse drug reaction (ADR) is a noxious, unintended effect of a drug, occurring at normal doses in human for prophylaxis, diagnosis or therapy of diseases or for modification of physiological function”.¹ It is considered to be 4th leading cause of death among hospitalized patients. About 2.9-5.6% of all admissions are caused

by ADR. As per Journal of American medical association, about 2 million serious ADR are reported annually, 350000 hospitalized patients experiences an ADR per year, and 100000 deaths occurred due to ADR.² ADR may vary from mild manifestation, requiring no medical treatment to serious ADR. American Food and Drug Administration defines a serious adverse event as one when the patient outcome is one of the following: death, hospitalization, disability, congenital anomaly, and requires intervention to prevent permanent impairment or damage.³

Therefore for ensuring safety and efficacy of drug or health related product, a very important tool is post marketing survey or pharmaco-vigilance. WHO defines pharmaco-vigilance as “The science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug related problems”.^{4,5}

Principle route for elimination of most of the drugs and its metabolite from the human body is the Kidney. In comparison with lipophilic drugs, hydrophilic drugs are mainly cleared by the kidneys. Reduction of renal reserve, which occurs in elderly as well as various diseases, lead to delayed renal clearance of many drugs. Therefore in patient with renal dysfunction, adverse drug reactions may be substantially high.

Aim of the Study: This study was conducted to find out the incidence of adverse drug reaction (ADR) in indoor and outdoor renal patients. Moreover, this study tried to ascertain the association of the offending drugs with the type of ADR, to

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assess the severity of various ADR and find out the preventability of the ADR.

METHODS

This is prospective observational case control study, which was conducted in 850 patients, who had either attended the Nephrology OPD or were admitted in the wards of Guwahati Medical College hospital with various renal disease, from January to June 2012. The renal diseases comprises of Nephrotic Syndrome, Glomerulo-nephritis, Acute kidney Injury, Chronic kidney disease with or without requiring dialysis, renal stone diseases, and post renal transplant recipients.

Inclusion criteria: Patients who either attended or were admitted in the nephrology ward with renal diseases. Ages of the patient ranged from 2 years to 74 years.

Exclusion criteria: patients who didn't give a written consent for this study.

Incidence of ADR was determined by Chart Review method. The **association** of the offending drugs with the type of ADR, - **causality** was ascertained by Naranjo's algorithm⁶, using questionnaires, with score ranging from -1 to + 2. Total score then calculated for an offending drug and association is termed as:

0 : Doubtful; 1 – 4 : possible; 5 – 8 : Probable; > 9 : Highly probable

Severity of ADR and preventability were assessed by Hartwig severity scale.⁷

Mild: reaction that does not require treatment. **Moderate:** reaction that requires treatment or hospitalization. **Severe:** life threatening.

Onset of the ADR: **Acute:** ADR occurring within 60 minutes after administration of the drug. **Sub-Acute:** ADR occurring within 60 minutes to 24 hours after administration of the drug. **Latent:** ADR occurring after 2 days of administration of the drug.

Preventability of ADR was ascertained by seven point questionnaires of Schumock and thorton preventability criteria¹⁰. Answering "YES" to one or more questions will substantiate the preventability.

STATISTICAL ANALYSIS

The descriptive data are represented by mean, standard deviation, and percentage. The differences between the groups were determined by the parametric t-test and non-parametric Fisher's exact test or chi-square test. For data analysis Graph Pad InStat version 3.12 was used. Odd ratio and 95% confidence interval (CI) were calculated. P< 0.05 is considered to be significant.

OBSERVATION AND RESULTS

Out of the 850 patients, 72 patients had ADR. Out these 40 /490 were male (8.16%) and 32 /360 were female (8.8%). In the t-test, it is found to be significant (p<0.042). Females were found to be more prone for ADR.

According to age, the patients were analyzed in three groups: Child (0 – 18 yrs), Adult (19 – 60 yrs) and Elderly (>60 yrs).

In the child group: 9/96 had ADR (9.37%); Adult group 57/714 (7.9%) had ADR and Elderly group 6/40 had ADR (15%, p<0.001).

In this study, elderly were more susceptible for ADR than the other group.

Types of ADR: A total of 37 different types of ADR were reported. Moon face (18%) was the commonest, followed by Allergic reaction (10.4%).

Table 1 Types of ADR

ADR	Frequency
Moon Face	16 (18.6%)
Allergic reaction	9 (10.4)
Constipation	8
Fluid & Electrolyte balance	4
Hirsutism	4
Tachycardia	3
Melaena	3
Tremor	3
Cataract	3
Blurred vision	3
Acne	2
High Blood Pressure	2
Glaucoma	2
Ulcer	2
Thrombocytopenia	2
Tinnitus	2
Pruritus	1
Arthralgia	1
Dry Mouth	1
Hyperglycaemia	1
Ototoxicity	1
Nausea	1
Vomiting	1
Pancytopenia	1
Diarrohea	1
Dry Cough	1
Hypotension	1
Pain abdomen	1
Chest Pain	1
Dyspnoea	1
Palpitation	1
Hepatotoxicity	1
Gum Hyperplasia	1
Myalgia	1
Necrosis of finger tips	1
Depression	1
Memory Loss	1

Causality Analysis: Naranjo's scale,⁶ with score ranging from -1 to +2 was used to analyze the causality. Total score then calculated for an offending drug and association is termed as: 0 : Doubtful; 1 – 4 : possible; 5 – 8 : Probable; > 9 : Highly probable.

Majority of ADR were found to be highly probable (47/72, 65%), followed by Probable (18/72, 25%), then Possible 7/72 cases.

Severity Assessment: Severity of ADR was assessed by Hartwig severity scale.⁷ **Mild group:** a reaction that does not require treatment. **Moderate group:** a reaction that requires treatment or hospitalization. **Severe group:** life threatening ADR.

Majority of ADR were found in this study to be mild in severity (47/89, 52.8%), followed by of Moderate severity (38/89, 42.6%), and finally 4.4 % (4/89) were in the severe group.

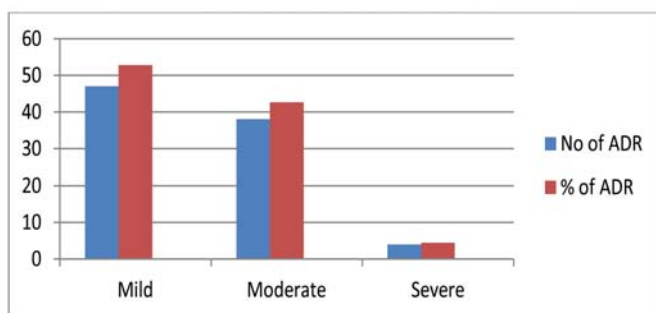


Figure 1 Severity assessment

Onset of ADR: ADR were grouped according to the onset into following three groups: **Acute:** ADR occurring within 60 minutes after administration of the drug. **Sub-Acute:** ADR occurring within 60 minutes to 24 hours after administration of the drug. **Latent:** ADR occurring after 2 days of administration of the drug.

In this study, it was found that most of the ADR occurred in the Latent group (58.1%, 53/89), followed by Sub-acute group (33.7%, 30/89), and finally the acute group with 6.7% (6/89).

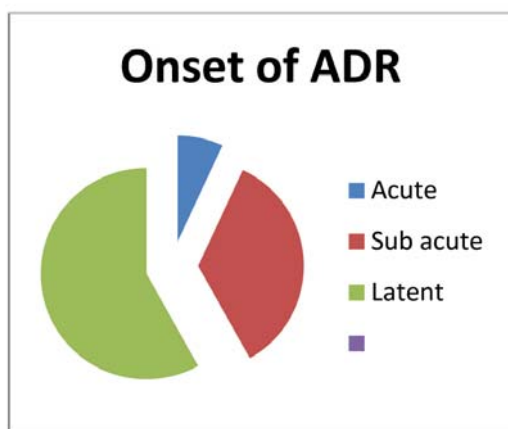


Figure 2 Onset of ADR

Preventability of ADR: Preventability of ADR was ascertained by seven point questionnaires of Schumock and thorton⁸ and the preventability criteria. Out of these 89 episode of ADR, only 11 (12.3 %) were preventable and remaining 87.6 % (78/89) were non-preventable. These large numbers were non-preventable because susceptibility of these ADR is still not defined and they require further study.

DRUG CAUSING ADVERSE REACTIONS

About 450 medicines were prescribed in these patients with ADR. Prednisolone was the most common offending drugs in 23 (26.7%) cases, followed by analgesics.

Table 2 Most commonly ADR causing Drugs

DRUGS	No (%)	ADR
Prednisolone	23 (26.7%)	Moon Face, Hyperglycaemia, Cataract, Glucoma, Hirsutism, Melaena, Acne, Depression
Nimesulide (taken over the counter, outside the hospital)	12 (13.9%)	Melaena, Gastritis, Thrombocytopenia
Diclofenac (taken over the counter, outside the hospital)	11 (12.7%)	Melaena, Gastritis, Allergic reaction
Furosemide	10 (11.6%)	Dry Mouth, Fluid & electrolyte imbalance
Cyclosporin	8 (9.3%)	Tachycardia, gum hyperplasia, Hair Growth
Atorvastatin	4 (4.65 %)	Myalgia, hepatotoxicity, Memory loss

RELATIONSHIP OF MULTIPLE MEDICATIONS WITH ADR

For analysis of the relationship, the patients were divided into 3 groups: Group1: that receiving 1 – 5 numbers of medications. Group2: those receiving 6 – 10 number of medications. Group3: those receiving > 10 number of medications.

It was found that Group 3 patients had the highest number of ADR 48.6 % (35/72 cases; prevalence of ADR 9.45%, or 1.06 (0.4-1.5), followed by Group 2, with 26.3 % (19/72 cases; prevalence of ADR 6.7 %, or 0.73 (0.4-1.3), and finally Group 1 with 25% (18/72 cases; prevalence of ADR 9 %, or 1.00 (reference). So it implies that patient receiving more than 5 medications are at higher risk of ADR.

DISCUSSION

This was a prospective observational study, to evaluate the incidence of ADR in OPD and Indoor patient. Out of 850 patients included in the study, 72 (8.47 %) patients were found to have one or more ADR. Total numbers of ADR were 89. This is significantly lower than data reported from other countries, which ranges from 10% to 18% of cases.^{11,12}

The number of Male patient was 40 and female 32. In the t-test, it is found to be significant ($p < 0.042$). Females were found to be more prone for ADR than male. Tharpe et al reported that women have a nearly 2-fold greater risk for developing ADRs than men¹¹. Redmaker et al. reported that women have 1.5 times more at risk of developing ADR than male.¹² In an analysis of 48 community-based cohort studies from the UK, the overall incidence of suspected ADRs in males was 12.9 per 10 000 patient-months of exposure, and in females was 20.6 per 10 000 patient-months of exposure. The overall age-standardized odds ratio of an ADR in females compared with males was 1.6 [95% confidence interval (CI) 1.5 to 1.7].¹³

Female patients have a 1.5- to 1.7-fold greater risk of developing an ADR. Female patients have a 1.5- to 1.7-fold greater risk of developing an ADR. In an analysis of 48 community-based cohort studies from the UK, the overall incidence of suspected ADRs in males was 12.9 per 10 000 patient-months of exposure, and in females was 20.6 per 10 000 patient-months of exposure.⁹

The overall age-standardized odds ratio of an ADR in females compared with males was 1.6 [95% confidence interval (CI) 1.5 to 1.7]. This may be due to pharmacokinetic, immunological

and hormonal factors as well as gender-related differences in the use of medications. Further studies are required with adequate number and strength in this regard.

Commonest age group of patient with ADR was 19 - 60 years of age. Lot of other studies also has confirmed this. Stewart et al. reported that increase in the incidence of ADR in elderly is due to polypharmacy.¹⁴ A meta-analysis of 68 observational studies reported that the proportion of admissions related to ADRs in older people was four times higher than in younger people.¹⁵ ADRs in elderly are largely contributed by polypharmacy, prescribing error, the effect of age and frailty on drug disposition, especially renal and hepatic clearance, increased pharmacodynamic sensitivity of the elderly to several commonly used drugs, e.g., central nervous system and cardiovascular drugs.

In this study, prednisolone was found to be responsible for maximum number of ADRs (26.7%). Its use was associated moon Face, hyperglycaemia, cataract, glaucoma, hirsutism, melasma, acne, depression. Joshua et al also reported the about similar incidence with use of prednisolone.⁹ Moon face was the commonest ADR (18.6%) in this study. But in a study evaluating the incidence of moon faces in 88 patients on long-term systemic corticosteroid therapy for all diseases, Fardet et al. reported as 61% at 3 months and 70% at 12 months.¹⁶ Prednisolone is one of the most commonly used medications in various renal diseases. Probably because of monitoring and stepwise reduction of steroid dose to bare minimum, in this study incidence of moon face is lower.

Second ADR in this study is found to be Allergic reactions (10.4%). The patients with Nephrotic syndrome, or Glomerulonephritis, or renal failure or post renal transplant are in a hypo-immunity state, so they develop lot of infections. To prevent or treat these infections lot of antibiotics, antifungal or antiviral medications are often prescribed. These may be implicated for the high incidence of allergic reaction encountered in this study.

Regarding severity, in this study, most of the patients had mild ADR (44/72, 51.1 %), which did not require hospitalization. These ADR responded quickly with either stoppage or modification of the offending drugs. This may be due to active monitoring and timely withdrawal of the offending drugs.

In this study, it was found that most of the ADR occurred in the Latent group (58.1%, 53/89), followed by Sub-acute group (33.7%, 30/89), and finally the acute group with 6.7% (6/89).

In this study, out of these 89 episode of ADR, only 11 (12.3 %) were preventable and remaining 87.6% (78/89) were non-preventable. These large numbers were non-preventable because susceptibility of these ADR is still not defined and they require further study.

Majority of ADR reported in this study were highly probable (47/72, 65%) of a single or more than two medications, which are known to cause these type of ADR. But as these drugs are of proven efficacy or they have been recommended in clinical practice guidelines, these drugs had to be used.

Finally, poly-pharmacy, or use of more than five drugs in a patient was found to be significantly associated with higher incidence of ADR (48.6%). In a similar study, Joshua et al. reported this incidence to be as high as 91%.⁹ As most of the renal diseases are associated with co-morbidities like diabetes, hypertension, anaemia, cardiac disease, etc, polypharmacy is unavoidable and this increases the risk of ADR.

CONCLUSION

ADR is common in renal patient, inspite of careful monitoring and timely follow. Commonly used nephrological drugs have known adverse effects. But as they are of proven efficacy or have been recommended in various clinical practice guidelines, these drugs have to be used frequently and for considerable duration of time. This may be the reason most of ADR recorded in this study are not preventable. But clinician should always remain alert and vigilant for these ADR in a renal patient.

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Contribution of authors: We declare that this work was done by the author(s) named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors". The first author conceived, designed the study and second author analyzed the data.

REFERENCE

1. International drug monitoring: The role of national centers. Technical report series 498. WHO: Geneva; 1972. [cited 2016 September 17]; Available from: URL:<http://who-umc.org/graphics/24756.pdf>
2. Hussain MM, Girhepunje K, Pal R, Siddiqua SS. Incidence of Adverse Drug Reactions in a Tertiary Care Hospital: A Systematic Review and Meta-Analysis of Prospective Studies. *Der Pharmacia Lettre* 2010;2(3):358-368.
3. MedWatch - What Is A Serious Adverse Event?. 2007-09-18. [cited 2016 September 17]; Available from: URL:<http://www.fda.gov/medwatch/report/DESK/advevnt.htm>
4. WHO definition of Pharmaco-vigilance. 2002 [cited 2016 September 17]; Available from: URL:http://www.who.int/medicines/areas/quality_safety/safety_efficacy/pharmvigi/en/
5. Sainul AP. Practical Implications Of Spontaneous Adverse Drug Reaction Reporting System In Hospitals - An Overview *Asian journal of pharmaceutical and clinical research* 2013;6(4):10-15.
6. Naranjo CA. A method for estimating the probability of adverse drug reaction. *Clinical Pharmacol ther* 1981 Aug;30(2):295-45.
7. Hartwig SC. Preventibility and severity assessment in reporting adverse drug reaction. *American journal of Hospital Pharmacology* 1992;49:2291-31.
8. Schumock and thorton. A method for estimating the preventability of adverse drug reaction. *Clinical Pharmacol ther* 1992 Aug 30(2):239-45.
9. Joshua L. Adverse drug reactions in Nephrology wards inpatient of tertiary care hospital. *Indian J Med Sci* 2007;61(10):
10. Jick H. Adverse drug reaction: the magnitude of the problem. *J Allergy clin immunol* 1984;74:555-557.
11. Tharpe N. Adverse drug reactions in women's health care. *J Midwifery Womens Health*. 2011 May-Jun;56(3):205-13.
12. Rademaker M.. Do women have more adverse drug reactions? *Am J Clin Dermatol* 2001;2(6):349-351.
13. Martin RM. Age and sex distribution of suspected adverse drug reactions to newly marketed drugs in general practice in England: analysis of 48 cohort studies. *Br J Clin Pharmacol* 1998;46:505-11.
14. Stewart RB. Polypharmacy in the aged. Practical solutions. *Drugs Aging* 1994;4:449-61.
15. Beijer HJ. Hospitalisations caused by adverse drug reactions (ADR): a meta-analysis of observational studies. *Pharm World Sci* 2002;24:46-54.
16. Fardet L. Incidence and risk factors for corticosteroid-induced lipodystrophy: a prospective study. *J Am Acad Dermatol* 2007;57:604-609.

ORIGINAL PAPER

A clinical study of non-alcoholic Fatty Liver disease in Type 2 Diabetes Mellitus

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ABSTRACT

Background: Non-alcoholic fatty liver disease (NAFLD) is no longer considered a benign condition and has been identified as a common cause of chronic liver disease globally. **Methods:** This study was done on 199 cases of Type 2 Diabetes Mellitus with proper history, thorough clinical examination, including exact height, weight with relevant investigations. **Results:** The prevalence was 65.8%. Evidence of NAFLD was noted in 59.15% of male and 82.45% of female. Most of the cases were asymptomatic and hepatomegaly was the only commonest physical sign. 83.47% participants with high BMI were found to have NAFLD. The mean of fasting, post-prandial glucose levels and that of HbA_{1c} in NAFLD, were significantly higher as compared to that with normal liver. The mean AST, ALT and ALKP levels were significantly higher as compared to the normal liver group. The ratio between AST and ALT was found to be 0.96. The mean of the total cholesterol, triglycerides and LDL were found significantly higher in the group with NAFLD, while difference in the mean value of HDL in both the groups were insignificant. **Conclusion:** NAFLD is more frequently encountered in poorly controlled Diabetes Mellitus, more so in presence of obesity and/or dyslipidaemia.

Keywords: Non-alcoholic fatty liver disease, hepatic steatosis, transaminases, Hyperlipidemia

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD), a disease practically unheard of 3 decades ago, is now considered as one of the most common causes of chronic liver disease in industrialized world.¹ The definition of NAFLD requires that a) there is evidence of hepatic steatosis either by imaging or histology, and b) there are no causes for secondary hepatic fat accumulation such as alcohol consumption, use of steatogenic medication, infection and

hereditary disorders. In the majority of patients, NAFLD is associated with metabolic risk factors such as obesity, diabetes mellitus and dyslipidaemia.

The prevalence of NAFLD in the section of the people having Type 2 Diabetes Mellitus is found to be higher than that in the general population with a maximum of 87% of the Type 2 Diabetics reported to have NAFLD.² It is also interesting to note that female subjects with Type 2 Diabetes Mellitus are more prone to develop NAFLD than their male counterparts although the overall prevalence of Type 2 Diabetes Mellitus in males are far more as compared to the females.³ Middle aged people, from 4th to 6th decades of life are seen to be affected by NAFLD, with a mean age of around 50-55 years.⁴ Most of the patients of NAFLD are asymptomatic while some may present with generalized weakness or right upper quadrant discomfort/pain of abdomen.^{4,5}

Hepatomegaly is the most common finding on clinical examination as well as ultrasonography of the abdomen, in initial presentation.^{4,5,6} Body Mass Index (BMI) is directly related to the development of NAFLD, so much so that it has been identified as an independent risk factor for development of NAFLD.^{4,5}

Higher values of plasma glucose levels and Glycosylated haemoglobin (HbA_{1c}) in patients of Type 2 Diabetes Mellitus are associated with increased incidence of NAFLD as compared to the lower values of the same.^{3,5}

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Asymptomatic mild elevation of serum transaminases, with the ratio of AST: ALT being usually less than 1, is sometimes seen though there is no concrete correlation between elevation of serum transaminases and development of NAFLD.⁷ Hyperlipidaemia (hypertriglyceridaemia, hypercholesterolaemia or both) is another common abnormality noted in patients with NAFLD.^{8,9}

Objectives: To study the prevalence and clinical presentations of NAFLD in persons with Type 2 Diabetes Mellitus and to assess its relationship to the Body Mass Index of the patient with correlation of the results of Liver Function Tests and Fasting Lipid Profile with ultrasonographic evidence of Fatty liver in these subjects.

METHODS

This observational descriptive study was conducted in Gauhati Medical College and Hospital, Guwahati from 1st August, 2014 to 31st July, 2015 with 199 participants of Type 2 Diabetes Mellitus with investigation of Complete Blood Count, Blood Sugar estimation (Random, Fasting and Post-prandial), Glycosylated Haemoglobin (HbA_{1c}), Creatinine and Blood Urea, Liver Function Tests, Urine R/E, Fasting Lipid Profile, HBsAg, Anti HCV, Anti HAV IgM, Anti HEV IgM, ultrasonography of whole abdomen, etc.

Inclusion Criteria: The patients included in this study were all diagnosed to have Type 2 Diabetes Mellitus (as per WHO criteria) belonging to both sexes and who were more than 18 years of age, presenting to the Out Patient Departments, with due consent.

Exclusion Criteria: Patients with history of alcohol consumption, jaundice, ascites or with history of suspected drug induced liver injury (DILI), major abdominal surgery, Chronic Renal Failure or severe ischaemic Heart disease and positive cases of Hepatitis B, Hepatitis C, Hepatitis A and Hepatitis E serology were excluded.

RESULTS

131 (65.83%) were detected to have hepatic steatosis or fatty liver on ultrasonography and were labeled as the '**NAFLD Group**' while 68 persons (34.17%) were found to have no hepatic steatosis and hence labeled as '**Normal Liver Group**'. Males out-numbered females in this study, but it was interesting to note that out of female Type 2 diabetics, the percentage of patients detected to be having NAFLD (82.46%) is much higher than that in males (59.15%) which is statistically significant (**Table 1**).

Table 1 Sex-wise distribution of prevalence of NAFLD

Group	Males (Total-142)	Females (Total-57)	Total Cases
NAFLD	84 (59.15%)	47 (82.46%)	131 (65.83%)
Normal liver	58 (17.55%)	10 (17.54%)	68 (34.17%)

The age of the participants of this study group varied from 26 to 90 years, the mean age being 54.37 ± 13 years. The age of more than half of the patients of the present study group, having NAFLD, ranged between 46 to 65 years (**Table 2**).

Table 2 Age-wise prevalence of NAFLD in Type 2 Diabetes Mellitus

Age group	Total Cases (199)	NAFLD (131)	Normal Liver (68)
26-35 years	16	6 (4.58%)	10 (14.70%)
36-45 years	41	33 (25.19%)	8 (11.76%)
46-55 years	51	36 (27.48%)	15 (22.06%)
56-65 years	54	40 (30.53%)	14 (20.59%)
>65 years	37	16 (12.21%)	21 (30.89%)

Of the patients diagnosed to have fatty liver, more than 50 percent (69 out of 131) were asymptomatic while about a quarter of patients (29.77%) had complaints of general weakness and malaise and while only 17.55% of subjects complained of abdominal discomfort or pain.

Signs of NAFLD in Type 2 Diabetes Mellitus are shown in **Table 3**.

Table 3 Presenting signs of NAFLD in Type 2 Diabetes Mellitus

Parameters (Total Cases 199)	NAFLD (131 Cases)	Normal Liver (68 Cases)
Hepatomegaly (≤ 15 cm)	92 (70.23 %)	7 (10.29 %)
Normal Size (d" 15 cm)	39 (29.77%)	61 (89.71%)
Mean Liver size	17.12 ± 3.53 cm	12.19 ± 1.94 cm

The Body Mass Index (BMI) varied from 17.4 to 30.1 kg/m² with a mean of 25.18 kg/m². The mean BMI of the patients in NAFLD group was calculated to be 26 ± 1.67 kg/m² and in the normal group, it was found to be 23.58 ± 2.48 kg/m². A BMI of 25kg/m² was taken as the cut off between overweight and normal weight and 121 persons of the study group were found to be above while 78 were below the cutoff mark. Out of 121 patients in the overweight group, 101 (77.1%) had ultrasonographically detectable fatty liver, while a statistically significant number of only 30 patients (22.9%) had evidence of fatty liver in the normal weight group (**Table 4**).

Table 4 Comparison of BMI of patients with or without NAFLD

BMI group (Kg/m2)	NAFLD group (131 Cases)	Normal Liver group (68 Cases)
Normal weight (<25)	30 (22.9%)	48 (70.59%)
Overweight (≥ 25)	101 (77.1 %)	20 (29.41 %)
Mean BMI	26 ± 1.67 kg/m2	23.58 ± 2.48 kg/m2

The glycaemic status of the participants in the study group was evaluated in terms of fasting and post-prandial blood sugars alongwith estimation of glycosylated haemoglobin (HbA_{1c}) levels and statistically significant difference ($p < 0.05$) was observed in the mean values of the parameters in both the groups of diabetic patients with or without NAFLD.

Table 5 Glycaemic status in patients with or without NAFLD

Parameters (Mean value)	NAFLD group	Normal Liver group
Fasting Blood Sugar	156.03±27.72 mg/dl	135.61±31.97 mg/dl
Post-prandial Blood Sugar	212.88±35.16 mg/dl	188.88±18.14 mg/dl
Glycosylated Haemo- globin (HbA _{1c})	7.61±0.74 NGSP	6.73±0.34 NGSP

Liver function tests done included the Serum Transaminases, Alkaline Phosphatase, Serum Total Bilirubin, Total Protein and Serum Albumin. Statistically significant difference in the mean levels of Aspartate Transaminase (AST), Alanine Transaminase (ALT), and Alkaline Phosphatase (ALKP) were noted between the group of diabetics with NAFLD and the group without it (**Table 6**).

Table 6 Mean levels of liver enzymes in patients of both groups

Liver enzyme	NAFLD group	Normal Liver group
Mean AST level (IU/L)	49.29± 11.52	28.5± 7.93
Mean ALT level (IU/L)	51.29± 10.73	33.54± 8.98
Mean ALKP level (IU/L)	151.50± 43.35	128.30± 25.73

Out of the 131 patients with NAFLD in this study group, it was observed that 85 (64.89%) had elevation of both AST and ALT levels, with approximately equal prevalence in both the sexes ; however isolated elevations in ALT were frequently noted in females (21.28%) and isolated elevations of AST were more marked in the male subjects (22.62%)(Table. 7). The AST/ALT ratio was 0.96 in this study.

Table 7 Pattern of elevation of aminotransferase in both sexes

Aminotransferase	NAFLD (131)	Male (84)	Female (47)
Isolated AST elevation	26 (19.85%)	19 (22.62%)	7 (14.89%)
Isolated ALT elevation	20 (15.27%)	10 (11.9%)	10 (21.28%)
Elevation of both AST & ALT	85 (64.89%)	55 (65.48%)	30 (63.83%)

No statistically significant difference in the mean levels of both serum total Bilirubin and serum total protein were noted in the two groups of diabetic patients, one with evidence of NAFLD and the other without it (**Table 8**).

Table 8 Mean total bilirubin and protein levels in both the groups

Parameter	NAFLD	Normal
Mean serum Total Bilirubin (mg/dl)	1.2 ± 0.23	1.0 ± 0.17
Mean serum Total Protein (gm/dl)	7.07 ± 0.31	6.97 ± 0.19

The fasting lipid profile in both the groups of patients showed statistically significant difference ($p < 0.05$) in the mean levels of serum cholesterol, serum triglyceride and serum low-density lipoprotein (LDL) between the group of Type 2 Diabetics with NAFLD and that without NAFLD, while no significant difference was noted in respect of the mean levels of serum high-density lipoprotein (HDL) (**Table 9**).

Table 9 Mean levels of fasting lipid profile in both the groups

Mean levels of fasting lipids	NAFLD group (mg/dl)	Normal Liver Group (mg/dl)	p value
Cholesterol	210.52±31.51	187.08±16.87	<0.05
Triglyceride	210.57±85.02	166.98±51.37	<0.05
LDL	120.93±29.58	94.88±12.48	<0.05
HDL	48.42±10.29	50.14±7.71	>0.05

Subjects showing elevated levels of components of fasting lipid profile in both groups are shown in **Table 10**.

Table 10 Distribution of elevated values of components of fasting lipid profile in both groups

Group of patient	Total Cholesterol (>200mg/dl)	Triglyceride (>150 mg/dl)	LDL (>100mg/dl)	HDL (> 50mg/dl)
NAFLD(n=131)	91 (69.47%)	77 (58.78%)	75 (57.25%)	57 (43.51%)
Normal(n=68)	26 (38.24%)	28 (41.18%)	28 (41.18%)	40 (58.82%)
Total (n= 199)	117 (58.80%)	105 (52.77%)	103 (51.76%)	97 (48.74%)

(‘n’ indicates total number of cases in the group and percentage is calculated against “n” of each group.)

DISCUSSION

The more number of males over the female were possibly due to the fact that Type 2 Diabetes Mellitus is more common in males and that more male patients came for routine evaluation of health. The prevalence of NAFLD amongst the diabetics have been found to be 65.83 %. Similar reports of high prevalence of fatty liver in Diabetes have been reported from different parts of the world.^{1,3,4,10}

In the female type 2 diabetics, the prevalence of fatty liver was higher than that in the males and the female to male ratio was 1.4:1. Female sex have been reported to have a higher predisposition to the development of fatty liver in the general population, and the same has also been found amongst the diabetics.^{3,5}

The middle aged people are seen to be more affected by this entity. Maximum number of cases presented in the age range between 56 to 65 years followed by those in 46 to 55 years.⁴

As most of the patients of NAFLD present without any specific symptoms, fatty liver is detected only on clinical examination or on ultrasonographic examination. Some patients may have minor symptoms like generalized weakness, upper abdominal discomfort or pain.^{4,5} As the symptoms are trivial, awareness about this entity is important not only for diabetics, but also for the general population.

The only clinical sign of significance in non-alcoholic fatty liver disease is hepatomegaly, which is mostly asymptomatic and it was detected in about 70% of the subjects having evidence of NAFLD in our study. The rest had ultrasonographic evidence of hepatic steatosis without enlargement of liver. None of the patients included in our study had evidence of splenomegaly or

ascites. Statistically significant difference was noted on comparison of the mean liver size in the NAFLD group and the normal liver group.^{4,5}

The mean Body Mass Index (BMI) was found to be significantly higher in the NAFLD group than that in the normal liver group. Amongst the whole study population, 121 had a BMI of more than 25 kg/m² irrespective of their hepatic status, 101 (83.5%) of whom were found to have NAFLD. The relationship between high BMI and prevalence of NAFLD, as seen in many studies worldwide, has prompted the identification of obesity as an independent risk factor for the development of NAFLD.^{3,4}

It has been noted in many earlier studies that poor glycaemic control is associated with higher incidence of NAFLD.^{3,5} In our study also, it was observed that the levels of the fasting and the post-prandial blood sugar and that of the glycosylated hemoglobin were significantly higher in the NAFLD group than those in the normal liver group.

Statistically significant difference between the two groups, in the quantum of elevation of AST, ALT and Alkaline Phosphatase, in terms of their mean levels and also in terms of the number of persons showing enzyme elevation, was noted in this study. In the group with NAFLD, majority of the patients had elevation of both AST and ALT while isolated elevation of ALT was frequently noted in the female subjects and isolated AST elevation was seen more often in the males. Asymptomatic mild elevation of transaminases is one of the most commonly reported and studied abnormality in NAFLD.¹¹ Usually the ratio between AST and ALT is reported to be less than 1 and in our study also it was found to be 0.96. In a few major studies, the levels of ALT were noted to be higher than that of AST in case of NAFLD whereas the pattern is altered in case of alcoholic hepatitis. Although values <1 suggest NAFLD, a ratio of ≥ 2 is strongly suggestive of alcoholic liver disease.¹¹

There was no significant difference in the levels of total bilirubin and total protein between the two groups which were similar to the studies done elsewhere.

Fasting lipid profile estimation in the patients showed statistically significant higher values of total cholesterol, triglyceride and LDL in terms of both i) the number of patients showing elevation of the values more than the upper limit of normal and ii) and the mean values of the individual parameters, in the NAFLD group as compared to the normal liver group. Hyperlipidaemia (hypertriglyceridaemia, hypercholesterolemia or both) is a common abnormality and has been reported in 20% to 81% of patients with NAFLD.⁸ Dyslipidaemia was present in 65% of cases of NAFLD at the Virginia NAFLD Clinic.⁹ Hyperlipidaemia, specifically hypertriglyceridaemia, has been strongly correlated with liver fat accumulation and has been postulated as an independent risk factor for development of NAFLD.¹²

A significant proportion of patients previously thought to have 'Cryptogenic Cirrhosis' share many of the clinical and demographic features of NAFLD, suggesting that the etiology of their cirrhosis may be unrecognized NAFLD.¹³ Outcomes of NAFLD are different in different groups and various studies, that looked at the outcome of people with Type 2 Diabetes with NAFLD, report a more aggressive form of disease and grave outcome.

CONCLUSION

The present study concludes that NAFLD is commonly associated with type 2 diabetes mellitus, particularly in those who are overweight, and is also associated with dyslipidaemia

and poor glycaemic control, even though the patient may not have any specific signs or symptoms. Asymptomatic elevation of liver enzymes, and particularly when the ratio between AST and ALT is less than one, may be a useful non-invasive indicator of liver dysfunction in the form of NAFLD. It is, therefore, crucial that the modifiable factors such as weight, dyslipidaemia and hyperglycaemia be adequately controlled to prevent further liver dysfunction. It is of immense importance to educate the patients as well as the general public about these seemingly innocuous factors so as to ensure earlier presentation, diagnosis and management of NAFLD and to prevent its progression further.

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Ethical clearance: Taken.

Contribution of authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

REFERENCES

1. Prashanth M, Ganesh HK, Vima MV, John M, Bandgar T, Joshi SR et al. Prevalence of nonalcoholic fatty liver disease in patients with type 2 diabetes mellitus. *JAPI* 2009;57:205-210.
2. Suzuki A, Angulo P, Lymp J, St Sauver J, Muto A, Okada T, Lindor K. Chronological development of elevated aminotransferases in a non-alcoholic population. *Hepatology* 2005;41:64-71.
3. ShobhaLuxmi, Rukshana Abdul Sattar, Jamal Ara. Association of non-alcoholic fatty liver with type 2 diabetes mellitus. *JLiaquatUniv Med Health Sci* 2008;7(3):188-193.
4. Akber DH, Kawther AH. Non-alcoholic fatty liver disease in Saudi Type diabetic subjects attending a medical outpatient clinic. *Diabetes Care* 2003;26:3351-65.
5. Jayarama N, Sudha R. A study of non-alcoholic fatty liver disease in type 2 diabetes mellitus in a tertiary care centre, southern India. *J of clin and diagnostic research* 2012;6:243-45.
6. Lee RG. Non-alcoholic steatohepatitis: A study of 49 patients. *Hum Pathol* 1989;20:594-98.
7. Mofrad P, Contos MJ, Haque M, Segeant C, Fisher RA, Luketic VA et al. Clinical and histologic spectrum of NAFLD associated with normal ALT values. *Hepatology* 2003;37:1286-92.
8. Ludwig Y, Viaggiato TR, McGill DB, Oh BJ. Non alcoholic steatohepatitis. *Mayo Clin Proct* 1980;55:434-38.
9. Neuschwander-Tetri BA, Bacon BR. NASH. *Med Clin North Am* 1996;80:1147-1166.
10. Gupte P, Amarapurkar D, Agal S, Baijal R, Kulshrestha P, Pramik s et al. Non alcoholic steatohepatitis in type 2 diabetes mellitus. *J Gastroenterol Hepatol* 2004;19:854-8.
11. Powell EE, Cooksley WG, Hanson R, Searle J, Haliday JW. The natural history of nonalcoholic steatohepatitis: A follow up study of 42 patients upto 21 years. *Hepatology* 1990;11:74-80.
12. Angulo P, Keach JC, Batts KP, Lindor KD. Independent predictor of liver fibrosis in patients with non-alcoholic steatohepatitis. *Hepatology* 1999; 30:1356-62.
13. Williams CD, Stangel J, Asike MI, Torres DM, Shaw J, Contreras M et al. Prevalence of non-alcoholic fatty liver disease and non-alcoholic steatohepatitis among a largely middle aged population utilizing ultrasound and liver biopsy: A prospective study. *Gastroenterol* 2011;140:124-31.

ORIGINAL PAPER

Age Related Histological changes of Human Spleen

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Abstract

The spleen was a source of intrigue to ancient physician and philosophers. It is the largest lymphoid organ takes important part in body immunity, as high incidences of serious bacterial infections were reported following splenectomy in infancy. A research work was carried out in the department of Anatomy, Gauhati Medical College. The histological characteristics of 21 normal human spleens were studied under light microscope in different age groups and to correlate them functionally. The specimen of spleen varies from newborn to eighty year old cadavers, within stipulated time limit after fulfilling the formalities. The spleens were first washed in normal saline, dried with blotting paper. Tissues were fixed, processed and slides were prepared using standard laboratory procedure of haematoxylin and eosin staining. The size of white pulp that seen on histological sections, increase with age, reach its peak around puberty and then involutes. Sizes of white pulp were measured and then statistically analysed using Student's T-test. P value d" 0.05 is considered as statistically significant. The data obtained in this study will help in certain medico-legal practices and will give insight of different clinical presentations. This study may be used as a podium for further sophisticated studies.

Keyword: Human Spleen, White pulp, Red pulp, Marginal Zone

INTRODUCTION

The spleen is the largest of the so called ductless glands. It is functionally connected with blood; since white cells are formed and red cells are destroyed within it.¹ The splenic capsule is rich in elastic fibres in its deeper layers. It contains a few stellate elements beyond the typical fibroblasts.² It is covered by capsule of 1—2 mm thickness. In human the capsule is rich in collagen and contains some elastic fibres with few or no smooth muscle cells and their function is largely related to immunologic protection, hence the human spleen has been categorised as a defence spleen. Many mammals have splenic capsules and trabeculae with abundant smooth muscle cells, which on autonomic stimulation contract to expel large volumes of blood to the general circulation. Such spleen has been described as

storage spleen.³ The splenic sinusoids are supported externally by circumferentially and longitudinally disposed reticular fibres, which are components of the fibrous reticulum.⁴ Macroscopically the spleen appears to consist of discrete 0.5—1 mm white nodules, called white pulp. In the white pulp, the T cell areas surround the central arteries, forming the periarteriolar lymphoid sheath (PALS). These central arterioles are so named because they have a cylindrical cuff of lymphoid tissue around them, the PALS consisting mainly of T lymphocytes. The white pulp is of two types, T cell and B cell, together making upto 5-20% of the total mass of the spleen.⁵ The Malphigian corpuscles are composed of lymphoid tissue gathered up into globular or cylindrical masses of densely packed reticular fibres which envelop the small arterioles.¹ Some small branches of splenic artery leave the trabeculae and their tunica adventitia becomes replaced by a sheath of lymphatic tissue.⁶ These branches are described as arterioles⁷ or small arteries.⁸ Malphigian bodies vary from 0.25mm to 1mm in diameter. With the naked eye, the Malphigian bodies appear as minute whitish dots (white pulp).⁴ The size of the white pulp changes in relation to age, birth to early adulthood, the white pulp forms the greater volume of the spleen, but with increasing age it regresses, the number of splenic nodules decreases, and the red pulp become increasingly prominent.⁹ The follicles usually get atrophy with increasing age and may be absent in very elderly.⁴ The transitional region between lymphoid tissue and red pulp is called marginal zone having a thickness of 80 to 100 micrometer. It is the region of the red pulp that receives the incoming arterial blood, so the blood borne cells and particulate matter first contact the splenic parenchyma. Here, the lymphocytes of the recirculating pool leave the blood of the sinuses to enter the periarterial lymphoid sheath.² Red pulp constitutes the majority (75%) of the total splenic volume.

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It contains large number of venous sinusoids that ultimately drain into tributaries of the major splenic veins.⁴ The cells present in spleen includes erythrocytes, white blood cells and macrophages.⁸ From birth to early adulthood, the white pulp forms the greater volume of spleen, but with increasing age it regresses, the number of splenic nodule decreases and the red pulp become increasingly prominent.¹⁰

OBJECTIVES

- To study histological findings of human spleen in different age groups.
- To compare the histological findings of human spleen in different age groups.

MATERIALS

The study on human spleen was conducted in the department of Anatomy, Gauhati Medical College Guwahati.

Collection of specimen: (i) From the department of Forensic Medicine, Gauhati Medical College, Guwahati, from the cadavers within stipulated time limit after fulfilling the formalities. Care was taken to collect the non-pathological specimens. (ii) From the cases of neonatal deaths in the department of Obstetrics and gynaecology.

Histological Processing and staining of tissue: Then the spleens were first washed in normal saline, dried with blotting paper. Immediately after biometry, depending on the size of spleen, slices were made by cutting the specimen with sharp scalpel in planes passing through hilum to capsule. The sizes of slices were about 3-5 mm thick and 4-5 mm in dimension. The fixation of the slices were done and tissue was processed. The sections of the tissues were stained by routine haematoxylin and eosin according to standard method of Carleton (1957).¹ The stained sections were examined under both low power and high power light microscope to see the capsule, white pulp, red pulp, marginal zone and trabeculae forming the splenic architecture in each age group.

Analysis: The data recorded was analysed statistically using Student's T-test. *P* value < 0.05 is considered as statistically significant

RESULTS AND OBSERVATIONS

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Average size of white pulp of human spleen

Age group	Average Size of white pulp in micrometer
Paediatric group (0 to 14 years)	0.425
Adult group (15 to 50 years)	0.569
Geriatric group (More than 50 years)	0.256
SUM	1.239

Table 2 Mean size of white pulp of spleen in different age group

Class interval of different age group	Size of white pulp		
	f (frequency)	fr (relative frequency)	f% (percentage)
Pediatric	0.425	0.334	33.400
Adult	0.569	0.460	46.000
Geriatric	0.256	0.206	20.600
SUM	1.239	1.000	100.000

In **Table 2** for mean size of white pulp of the spleen the highest relative frequency 0.460 is seen in the 'adult age group' with a simple frequency of 0.569 and percentage of 46.000 and the lowest relative frequency 0.206 is seen in the 'geriatric age group' with a simple frequency of 0.256 and percentage of 20.600 which is evident in **Figure 1**.

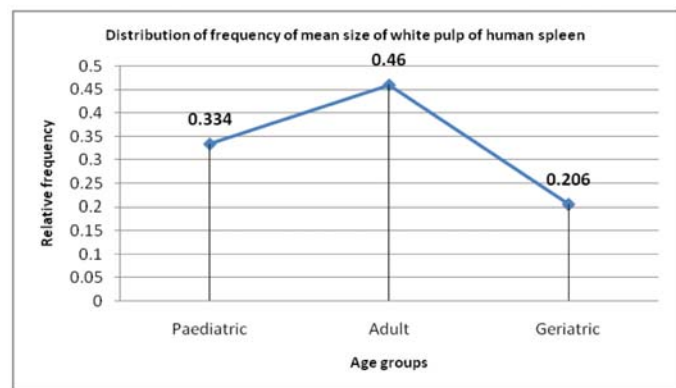


Figure 1 Distribution of relative frequency

Interpretation: After statistical calculation, it is observed that there is positive correlation for size of white pulp (0.98) in relation to age in pediatric age group so there is increase size of white pulp in relation to age but there is negative correlation exist between size of white pulp in relation to age in adult (-0.92) and geriatric age groups (-0.85) that means size of white pulp decreases with increasing age.

Tabulated *t* for degree of freedom 12 at 1% 5% and 10% level of significance are- $t_{0.01}=3.06$, $t_{0.05}=2.18$ & $t_{0.1}=1.78$

Calculated *t* between pediatric and adult group = 1.155 = statistically not significant. Calculated *t* between adult and geriatric group = 3.915 = statistically significant. The parameters are statistically analysed by *t* test and comparisons between pediatric and adult age group found to be statistically not significant but between adult and geriatric age group is found to be statistically significant.

Red pulp: The red pulp in a freshly cut section indicates red blood cells filled areas of spleen. With age, white pulp is replaced by red pulp.

Marginal zone: It is the interphase between white pulp and red pulp. It lies immediately peripheral to white pulp. From birth to early adulthood, the white pulp forms the greater volume of spleen, but with increasing age it regresses, the number of splenic nodule decreases and red pulp become increasingly prominent,

hence marginal zone also decreases with age. So, immunological activity also decreases with age. In newborn and young child, white pulps are not well formed. So, marginal zone is not fully developed hence, immunity is comparatively low in these age groups. B lymphocytes are the prominent lymphocyte in marginal zone.

DISCUSSION

Studies on microanatomy of spleen in different age groups have been forwarded many by research workers. Observations suggests that, the size of white pulp reaches its maximum dimensions around puberty and it has quite peculiar growth curve.¹¹ That white pulp of spleen reaches its maximum size in second decade of life then gradually involutes.^{9,12,13} In this study emphasis is mainly on measurement of the size of white pulps and red pulp, in histological sections. With increasing age white pulp regresses, the number of splenic nodules decrease and the red pulp becomes increasingly prominent.^{8,9} Our study is consistent with these universal observation.

Size of white pulp of human spleen in different age groups been measured in matched sets of observation using the null hypothesis: Reject H_0 if $P \leq t_a$ when $t_a = t_{0.05}$ setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing differences in size of white pulp of spleen between the tested groups.

CONCLUSION

In the present study the size of white pulp in pediatric and adult age group found to be statistically not significant but between adult and geriatric age group is found to be statistically significant. Hence, the present study has highlighted the histological changes of human spleen in different ages. The size of the white pulp seen on histological sections, increases with age, reaches its peak around puberty and then involutes. These changes indicate that the chances of infections are more common in very young and elderly persons. This can be correlated clinically, as post splenectomy sepsis is more common in newborn and infants. This study may be used as a pedestal for further sophisticated studies.

Conflict of interest: Nil

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to

claims relating to the content of this article will be borne by the authors.

Ethical Clearance: Taken from Institutional Ethical Committee.

REFERENCES

1. Carleton HM, Short RHD. The spleen. Schaffer's Essentials of Histology. 6th ed. New York. Toronto: Longman green and co. London; 1956. p. 56-87.
2. Bloom & Fawcett. The spleen. A Textbook of Histology. 9th ed. Toronto: W.B Saunders; 1970. p. 487-500.
3. Brunicardi F. C, Andersen D. K. Schwartz's Principles and Practice of Surgery. 8th ed. New Delhi: Mc Graw-Hill Medical Publishing division; 2005. p. 1298.
4. Standring S. Spleen. Gray's Anatomy-The Anatomical Basis of Clinical Practice. 40th ed. Churchill Livingstone: Elsevier; 2008. p. 1191-1194.
5. Young B, James S, Lowe, Stevens A, Health J. W. Wheater's Functional Histology-A text and colour atlas. 5th ed. Srinivasapuri, New Delhi: Churchill Livingstone; 2007: p. 229-233.
6. Ullah M. The Spleen, Circulatory system, Histology and Genetics, Theoretical and Applied. 1st ed. Meerut: Kedarnath Ram Nath Publisher; 1978. p. 480-485.
7. Wilfred M. C. Bailey's Textbook of Histology. 3rd ed. Baltimore 2, USA: The William and Wilkins Company; 1975. p. 353-363.
8. Ham A. W & Cormack D. H. Histology. 8th ed. Philadelphia and Toronto: JB Lippincott company; 1979. p. 356-358.
9. C Ronald Lesson, Thomas S. Lesson, Anthony A. Papario. Text Book of Histology. 5th ed. Philadelphia: W. B. Saunders Company; 1985. p. 277-278.
10. Boyd W. A Textbook of Pathology- structure and function in disease. Varghese Publishing House; 1988. p. 1157-60.
11. Kiernander B. Physical medicine in Paediatrics. 3rd ed. London Butterworth: W.B. Saunders Company; 1965. p. 8. Vol 1.
12. Bosker G. Geriatrics Emergency Medicine. 2nd ed. New York. Mosby year book; 1990. p. 286. Vol 1.
13. Grosfeld JL, O'Neill JA. Paediatric surgery. 6th ed. New Delhi. Mosby publisher; 2006. p. 1691. Vol 2.

ORIGINAL PAPER

Utilization pattern of family planning devices among married women in a selected tea community of Assam

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Abstract

Introduction: Family planning is one and only device to reduce the incidence of unwanted pregnancy and unsafe abortion, which is one of the leading causes of maternal death. Tea community is one of those communities where accessibility and availability of various health related programs still to be improved. **Purpose:** The purpose of the study is to find out the utilization pattern of family planning devices and factors affecting utilization pattern among married women belonging to tea community. **Method:** Semi-structured interview schedule was applied to 100 married women selected by simple random sampling and data were analyzed by using inferential statistic. **Results:** Majority of the married women (66%) were not using family planning devices. The most common factors of non-utilization were unwillingness of their husband (40.90%) and lack of awareness about the family planning devices (39.39%). Commonly used practices were oral contraceptive pill (50%) and tubectomy (44.12%). Leading factor identified for utilization of family planning devices was advices given by the health care provider (38.23%). **Conclusion:** Scaling up key intervention like increasing involvement of health care personal, providing access to family planning devices and increasing awareness for community participation could sharply increase utilization and contribute to reduce the maternal death due to abortion which will contribute to achieve MDG 4 and 5.

Keywords: Family Planning, Utilization Pattern, Married Women, Tea-Community

INTRODUCTION

India is the second most populated country in the world adding 16 million every year. The National health goal was to attain a birth rate of 91 and death rate of 9 pre 1000 by 2007. This yields an annual growth rate of 1.2%, which was considered essential for the stabilization of population of India over the next 50 years. The objective of the family welfare program in India is that is that

people should adopt the “small family norms” to establish the country’s the population at the level of 1533 million by the year 2050 AD.¹

Maternal healthcare remains a major challenge to the global public health system, especially in developing countries.² In India, considerable attention has been paid to estimates of maternal mortality, but mere has been reserved to the issue of adolescents pregnancies requires paramount attention.³ Despite substantial improvement in maternal health indicators in India, the proportion of adolescent deaths (9%) due to pregnancy or during child birth to total maternal mortality is unacceptably high.⁴ Studies have highlighted the relationships between early childbearing and adverse health outcomes potentially causing death among women in the 15–19 age groups.^{5,6} Acknowledging the importance of the issue, the United Nations focused on improving maternal health in the Millennium Development Goals to reduce Maternal Mortality Ratio (MMR) by 75% percent during 1990–2015.⁷ Additionally, adolescent pregnancies have been consistently associated with increased risk of adverse health outcomes, low birth weight, premature deliveries, high neonatal and post neonatal as well as infant morbidity and mortality.⁸

The theoretical framework represented by Thaddeus and Maine (1994) referred to socioeconomic/cultural factors (women’s status in household and society, educational and economic status of women etc.), accessibility to facility (distance, transportation etc.) and availability of quality of care (availability of staff and equipment in health facility centre) as the crucial factors behind maternal morbidity and mortality.⁹ However, marriage at a very

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young age is the major reason for early pregnancy in India.¹⁰ Studies have found that adolescents often lack experience, tend to be psychologically as well as emotionally less mature, all of which lead to poor maternal health outcome.¹¹ Some other factors such as education, economic status, healthcare programs and high cost of healthcare services have an impact on maternal healthcare utilization.^{12,13,14,15,16,17,18,19,20} A number of studies have discussed both accessibility and availability as determinants of health service utilization.^{21,22,23}

Family planning in India in the present day context is nothing new nor is it any surprising concept. People now do not raise their eyebrows to hear the word family planning “rather it is now accepted as something useful and beneficial by the general public in the urban cities, town and also in the rural areas of all over the country. Nevertheless, it is also a bitter fact that inspite of so much publicity of the need and importance of family planning, the government is still striving hard to cut down the population growth rate to the least minimum, so that the benefits of economic planning and development may become meaningful and the common may reap the results of economic property.¹

As of 31st March 2000, about 79 million couples (46.2 % of eligible couple) were effectively protected against conception by one or the other family planning method. However about 54% eligible couples are still unprotected against conception. Some states notably Punjab, Gujarat, Maharashtra, Karnataka, Haryana, and Tamil Nadu are forging ahead to cover more than half of their fertility level whereas other states like Bihar, Uttar Pradesh, Rajasthan, West Bengal, Jammu and Kashmir, and Assam are lacking behind with hopelessly low contraceptive acceptance levels. Assam have a population of 26,638000 in 2001 and there are about 40, 49000 of eligible couples. But only 15.2% of couples are effectively protected by all method including only 2.9% by spacing method and 12.3% by sterilization. Due to the above situations, it is necessary to carry out research in the field of family planning.²⁴

The present study was conducted with the objectives to find out the utilization pattern of family planning devices and factors affecting utilization pattern among married women belonged to tea community of Assam.

METHODS

Design and period of the study: A cross sectional community based descriptive survey design was used to conduct the study. Data were collected during the period from January 2011 to June 2011.

Study area: The study was conducted four sub centers of Sonapur Block PHC of the Kamrup Metro district.

Study population: All the married women of the tea community of 4 selected sub centers of Kamrup Metro district. 25 married women were selected randomly from each of the sub centre using RCH register maintained by female health workers of respective sub center.

Sampling: A multistage sampling technique was used to select the sample unit i.e. sub centers and the married women. A total of 100 married women were selected for interviewing.

Study methods: A cross sectional community based descriptive

survey was used to conduct the study. Semi structured interview schedule was used to collect information. Informed consent was taken from the women before collection of information.

RESULTS

Out of 100 married women, 74 married women were from the age group of 20 to 30 years, followed by 21 from 31 to 40 years and five were below 20 years. Regarding the educational status of the married women, 20 had formal education from class VI to X, 12 were educated up to class V and 68 had no formal education. On the other hand husbands of 32 married women had education from class VI to X, only seven had up to class V and 61 had no formal education. Out of 100 married women 66 were TGL, 32 were housewives, one was Anganwadi helper and one was daily laborer respectively. 95 married women husband were TGL, four drivers, one was laborer. Per capita per month family incomes for all the married women were below Rs. 974/ and all the women were Hindu in religion. The duration of marriage of 35 women were 6-10 years, 28 married women were 1-5 years, 24 were 11-15 years and only 13 married women were more than 15 years. Out of 100 married women, 33 had two children, 26 had only one child, 20 had three children, 10 had four, six had five, two had six and three had no child. 92 married women had normal per-vaginal delivery, three had cesarean section and three had instrumental delivery. Regarding the number of male child, 48 had only one, 16 had two, six had three and three had four. On the other hand, 50 had only one female child, 15 had two, eight had three, four had four, one had six and 22 had no female child. Age of the last child for 51 married women was one to five years, 29 were from five to ten years and only 17 were less than one year. 96 married women belonged to nuclear family and only four belonged to join family.

For 76 married women sub centre was the nearest health care facility available, for 23 married women PHC and only for one married women other health care facility. Distance of health care facility from habitant for 49 married women were less than one km, 23 married women were two to three km, 16 were three to five km and 12 were more than five km. Regarding the place of delivery, one had delivered at CHC, one at private hospital, two at FRU, 11 at GMCH, 41 at PHC and 41 at Home.

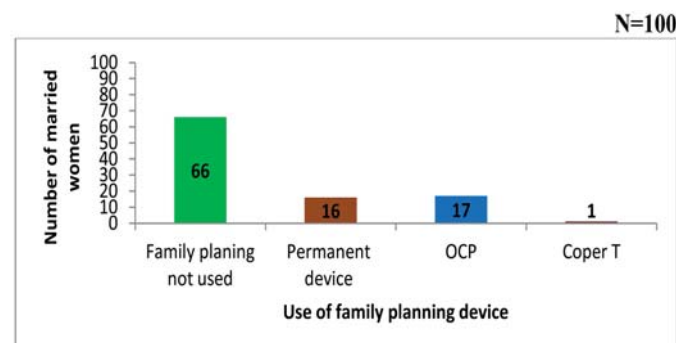


Figure 1 Utilization pattern of family planning devices by married women

Figure 1 shows that out of 100 married women 66 did not used any family planning devices, 16 used permanent devices, 17 used oral contraceptive and only one used copper T. From the further study the investigator found that out of 16, only one married women husband undergone NSV.

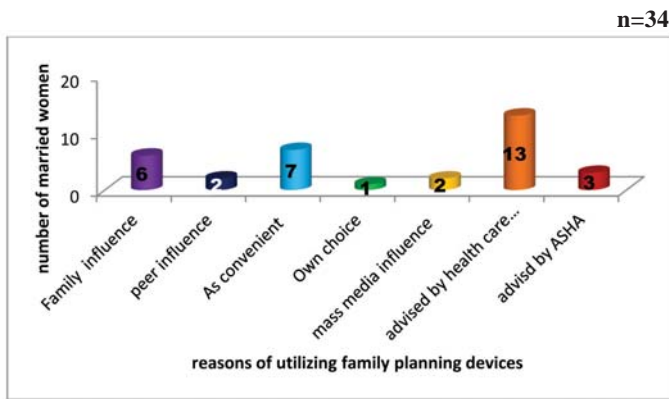


Figure 2 Reasons of utilizing family planning devices

The data presented in the **Figure 2** shows that out of 34 married women who have utilized family planning devices, six have utilized under the influence of family member, two because of peer group influence, seven used as it was convenient for them, one used by her own choice, two used under the influence of mass media, 13 used as they were advised by the health care provider and only three used as they were advised by ASHA.

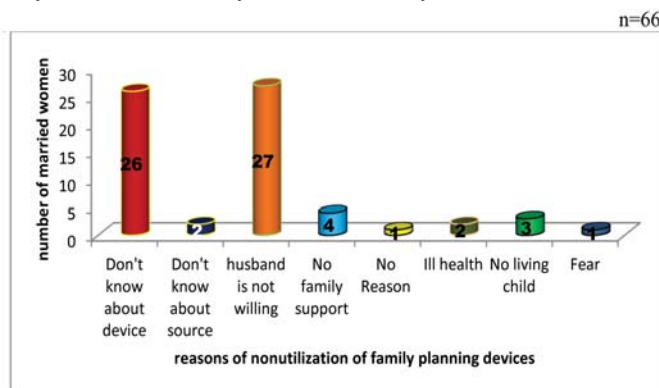


Figure 3 Reasons of non-utilizing family planning device

Data presented in the bar diagram (**Figure 3**) reflects about the reasons of not utilizing family planning devices among married women. 26 married women out of 66 did not know about the family planning devices, two did not know about sources, 27 married women husbands were not willing to use family planning devices, four married women were not supported by their family, one had no reason for non utilization, two did not used because of their ill health, three of them had no living child, and one married women did not used because of fear.

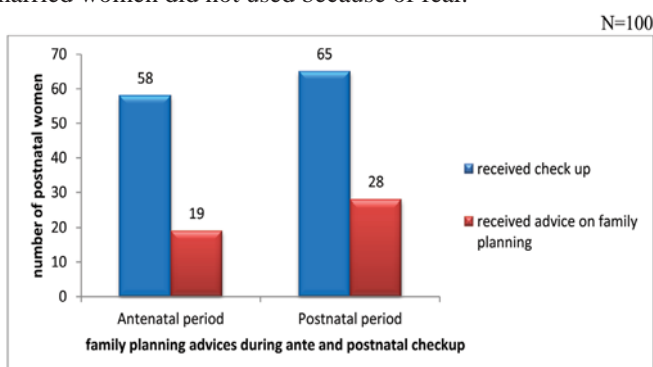


Figure 4 Distribution of married women according to receiving advices on family planning

The data presented in the bar diagram (**Figure 4**) reflects the scenario of utilization of ante natal and postnatal check-up by the married women. Out of 100 postnatal women only 58 had availed antenatal services during their last pregnancy and out of 58 only 19 married women received advices regarding family planning during antenatal check-up. On the other hand, 65 married women received postnatal check-up and out of them only 28 married women received advices regarding family planning.

DISCUSSION

The present study shows that 66 did not used any family planning devices, 16 married women used permanent device, 17 used oral contraceptive and only one used copper T. Study conducted by *Arjit Kumar, P Bhardwaj, J P Srivastava, P Gupta* reflects that the acceptance of family planning methods both temporary and permanent methods increased with level of literacy of women. About 53.40 % adopted I.U.C.D, 38.83% O.C pills and only 7.77% of their partners used condoms. 66.6% have undergone laparoscopic and 33.4% mini-lap sterilization.²⁵ Laya KS reported that 12.8 percent of the currently married women in India at present have an unmet need for family planning services, 6.2 percent for spacing and 6.6 percent for limiting. The percent of women having unmet need are much higher among those in the rural areas, at the younger ages and women having less than three children. Educational and working status of women is found to be highly significant with respect to their unmet need in India.²⁶ Mustafa R, Afreen U and Hashmi HA found that only 53(53%) of the respondents were using some sort of contraception. Barrier method (condoms) was in practice by 18(33.9%) and 12(22.6%) of women had already undergone tubal ligation. The women using injectables and intrauterine contraceptive devices were 10(18.8%) and 7(13.2%) respectively. Six were using oral contraceptive pills (11.3%). Positive attitude towards contraception was shown by 76(76%) of them, while 41(41%) stated their husbands' positive attitude towards contraception.²⁷

CONCLUSION

The study reveals that majority of the women have not used any contraceptive devices where the role of husband plays the most influencing factors of non-utilization. Most of the women received advices on family planning devices during their antenatal and postnatal checkup.

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Contribution of authors: "We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. The corresponding author further declare that this piece of research work was done under the guidance of Dr. Kunjalal Talukdar, Mrs. Kobita Borah had designed the study and myself engaged in collection and analysis of data".

REFERENCES

1. Dutta DC. Textbook of Obstetrics (6th Edition). Calcutta: New Central Book Agency (P)Ltd: 2004. P. 530-539.
2. Patton GC, Viner RM, Linh LC, Ameratunga S, Fatusi AO, et al. (2010) Mapping a global agenda for adolescent health. *Journal of Adolescent Health* 47(5): 427–432.
3. Santhya KG, Ram U, Acharya R, Jejeebhoy SJ, Ram F, et al. (2010) Associations between early marriage and young women's marital and reproductive health outcomes: evidence from India. *International Perspectives on Sexual and Reproductive Health* 36(3): 132–139.
4. Government of India (2011) Maternal Mortality in India 2007–09: Special Bulletin. Sample Registration System, Office of the Registrar General, Ministry of Home Affairs, New Delhi.
5. Reynolds HW, Wong EL, Tucker H (2006) Adolescents use of maternal and child health services in developing countries. *International Family Planning Perspectives* 32(1): 6–16.
6. World Health Organisation (2008) Adolescent Pregnancy. Geneva, Switzerland.
7. United Nations (2009) UN Millennium Development Goals. Available: <http://www.un.org/MillenniumGoals>. Accessed 2010 June 18.
8. Raj A, Saggurti N, Balaiah D, Silverman JG (2009) Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India: a cross-sectional, observational study. *The Lancet* 373(9678): 1883–1889.
9. Thaddeus S, Maine D (1994) Too far to walk: maternal mortality in context. *Social Science and Medicine* 38(8): 1091–1110.
10. Legrand TK, Mbacke CSM (1993) Teenage pregnancy and child health in urban Sahel. *Studies in Family Planning* 24(3): 137–149.
11. Filippi V, Ronsmans C, Campbell OM, Graham WJ, Mills A, et al. (2006) Maternal health in poor countries: the broader context and a call for action. *The Lancet* 368(9546): 1535–1541.
12. Sunil TS, Rajaram S, Zottarelli LK (2006) Do individual and program factors matter in the utilization of maternal care services in rural India? a theoretical approach. *Social Science and Medicine* 62(8): 1943–1957.
13. Navaneetham K, Dharmalingam A (2002) Utilization of maternal health care services in southern India. *Social Science and Medicine* 55(10): 1849–1869.
14. Gage AJ, Calixte MG (2006) Effects of the physical accessibility of maternal health services on their use in rural Haiti. *Population Studies* 60(3): 271–288.
15. Ram F, Singh A (2006) Is antenatal care effective in improving maternal health in rural Uttar Pradesh: evidence from a district level household survey. *Journal of Biosocial Science* 38(4): 433–448.
16. Singh L, Rai RK, Singh PK (2012) Assessing the utilization of maternal and child health care among married adolescent women: evidence from India. *Journal of Biosocial Science* 44(1): 1–26.
17. Saikia N, Singh A (2009) Does type of household affect maternal health? evidence from India. *Journal of Biosocial Science* 41(3): 329–353.
18. Pathak PK, Singh A, Subramanian SV (2010) Economic inequalities in maternal health care: prenatal care and skilled birth attendance in India, 1992–2006. *PLoS ONE* 5(10): e13593.
19. Kandel DB, Kiros GE, Schaffran C, Hu MC (2004) Racial/ethnic differences in cigarette smoking initiation and progression to daily smoking: a multilevel analysis. *American Journal of Public Health* 94(1): 128–135.
20. Stephenson R, Tsui AO (2002) Contextual influences on reproductive health service use in Uttar Pradesh, India. *Studies in Family Planning* 33(4): 309–3
21. Wagle R, Sabroe S, Nielsen BB (2004) Socio-economic and physical distance to the maternity hospital as predictors for place of delivery: an observation study from Nepal. *BMC Pregnancy and Childbirth* 4(1): 8–20.
22. Mohanty SK, Pathak PK (2009) Rich–poor gap in utilization of reproductive and child health services in India, 1992–2005. *Journal of Biosocial Science* 41(3): 381–398.
23. Rosenfield A, Charo RA, Chavkin W (2008) Moving forward on reproductive health. *The New England Journal of Medicine* 359(18): 1869–1871.
24. Park K. Text book of Preventive and Social Medicine. (18th Edition). Jabalpur: Banarasidas Bhanot Publishers; 2005. P. 361-374.
25. Kumar A, Bhardwaj P, Srivastava JP, Gupta P (2011). A study on family planning practices and methods among women of urban slums of lucknow city. *Indian Association of Preventive and Social Medicine State Chapter*. 23(2); 2011.
26. Laya K.S. Prevalence and Determinants of Unmet Need for Family Planning among Women in India Research and Social practices in Social Sciences. 7 (2) 59-70.
27. Mustafa R, Afreen U and Hashmi H.A. Contraceptive Knowledge, Attitude and Practice Among Rural Women *Journal of the College of Physicians and Surgeons Pakistan* 2008, Vol. 18 (9): 542-545.

ORIGINAL PAPER

Primary Bone Lymphoma: A Retrospective Histopathological Study at Tertiary Care Hospital

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Abstract

Background and aims: PBL is a rare condition and accounts for 5-7% of primary malignant bone tumors and 5% of extra nodal lymphomas. Because of the rarity of this tumor, we report our institute experience in this retrospective study. **Method:** We retrospectively analyzed the data for PBL in the department of Pathology Gauhati Medical College, Gauhati from August 2010 to July 2015. Biopsy specimens were received, stained with H and E stain and subsequently IHC was performed to confirm the diagnosis of Bone Lymphoma. **Results:** Total 10 cases were diagnosed as NHL. There was male preponderance and most of the patients were of elderly age group. On IHC, 9 cases were diagnosed as DLBCL while one case was diagnosed as ALCL. **Conclusion:** Although rare, most of the primary bone lymphoma are diffuse large B-cell lymphoma. A proper clinical history with radiological correlation is necessary to differentiate primary lymphoma from secondary involvement of extra skeletal lymphoma. Immunohistochemistry is important tool to differentiate NHL from other malignant tumors of bone.

Keywords: Non-Hodgkin Lymphoma, Immunohistochemistry, Extranodal lymphoma, Radiology (CT/MRI)

INTRODUCTION

Primary bone lymphoma is defined as a lymphoma that is confined to the bone or bone marrow without evidence of concurrent systemic involvement. It is a rare condition and accounts for 5 - 7% of primary malignant bone tumours and 5% of extranodal lymphomas and <1% of all non hodgkin's lymphoma.¹

PBL (NHL) of bone can be difficult to diagnose without high level of suspicion. The disease affects the middle aged to elderly population with median age of 48 years but also described in pediatric patient. The most common presentation of patient with PBL is bone pain, and less frequent presentations include a palpable mass and bone fracture or neurologic symptoms.² The metaphyses of bone is a common location of PBL.

Many PBL patients have had early clinical stage disease and most important prognostic factor has been the disease stage.

Clinical staging was determined according to the revised American Joint Committee of Cancer (AJCC) staging system for lymphoid neoplasm.³ Histopathologically the majority of PBL cases have been DLBCL according to the WHO classification.

MATERIAL AND METHODS

We retrospectively searched the data for primary bone lymphoma in the departments of pathology, radiology and orthopaedics from August 2010 to July 2015. Patients bio-data, clinical profile and histological diagnoses were also analysed. CT, MRI of the chest, abdomen and pelvis did not show any primary nodal origin or distant metastasis. In our department biopsy specimens were received in 10% formalin, decalcified and processed. The sections were stained with H and E stain. Immunohistochemistry was then performed to confirm the diagnosis of bone lymphoma.

OBSERVATION AND RESULTS

A total 10 cases were diagnosed as Primary bone lymphoma. Retrospective study revealed male & female ratio was 4:1. Pain was the most common presenting feature followed by swelling and pathological fracture. Seven cases occurred at 5th decade, one each at 2nd, 4th and 6th decade respectively. Solitary bone lesion was present in nine cases while one had multiple lesions. All cases showed destructive lesion with soft tissue involvement in three cases. Diaphysis of bone was involved in 3 cases and metaphysis was involved in 7 cases. Long bones were involved in 9 cases (5 cases in femur, 3 in Tibia, 1 in humerus) and 1 case in pelvis. On histopathological examination 9 cases were found to

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be diffuse large B-cell lymphoma (**Figure 1**) which was confirmed by IHC reported as CD45,CD20 positive (**Figure 2**) and CD3,CD99 and S100 negative. 1 case was found to be Anaplastic large cell lymphoma on HPE (**Figure 3**) and was confirmed by IHC as CD30,EMA,CD45 positive (**Figure 4**) and CD3,CD20,CD99 negative.

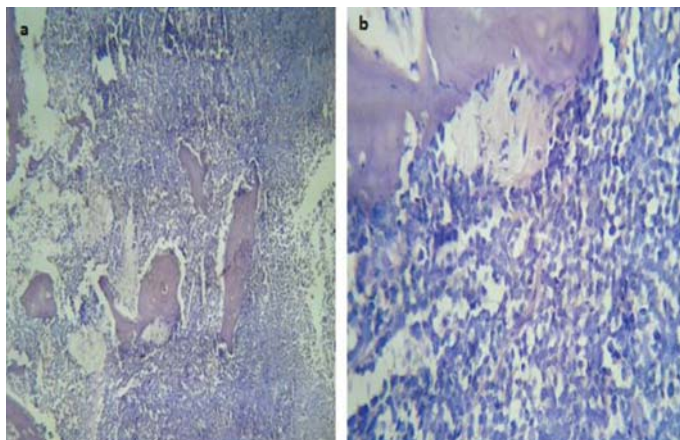


Figure 1 PBDLBCL shows (a) diffuse growth pattern of the lymphoma cells and permeate between the trabeculae (H and E, 100X) (b) diffuse sheets of large atypical cells with multi lobated nuclei and fine chromatin (H and E, 400X)

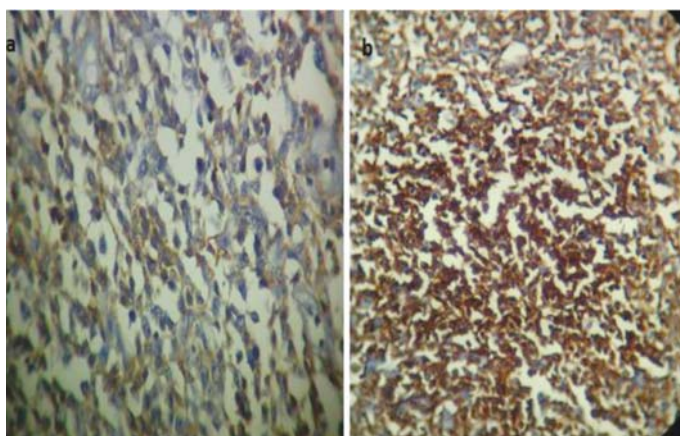


Figure 2 IHC staining showing membranous positivity in DLBCL of bone (400X) (a) CD45 (b) CD20

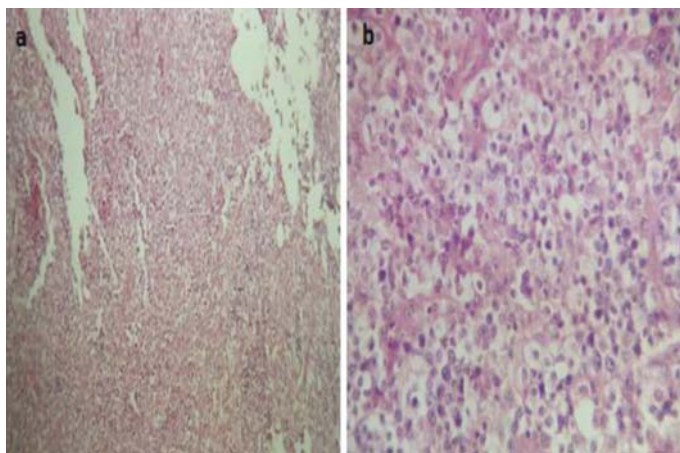


Figure 3 ALCL shows (a) diffuse growth pattern of tumour cells (H and E, 100X) (b) large cells with pleomorphic nuclei and multiple prominent nucleoli (H and E, 400X)

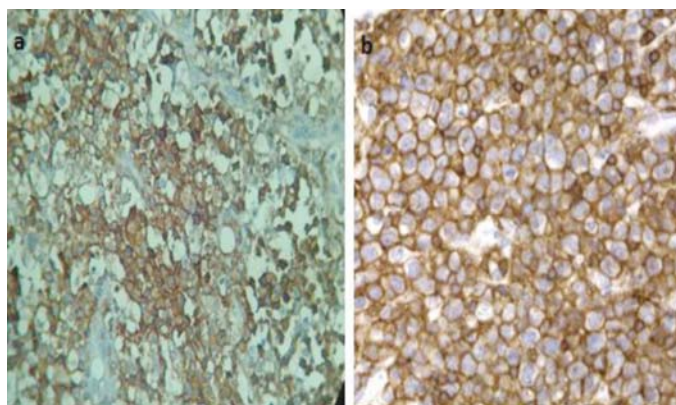


Figure 4 IHC staining showing membranous positivity in ALCL of bone (400X) (a) CD30 (b) EMA

DISCUSSION

The presentation of NHL as a localised bone tumour is relatively uncommon. Primary bone lymphoma was first described by Oberling⁴ in 1928. In 1939, Parker and Jackson⁵ described 17 cases of “primary reticulum cell sarcoma of bone” and established primary lymphoma of bone (PLB) as a distinct clinical entity.

Age distribution: The age of the diagnosed cases of lymphoma of bone ranged from 13 to 55 years with median age of 48 yrs.⁶ Our retrospective study reveals 7 cases occurred at 5th decade one each at 2nd, 4th and 6th decade respectively with median age of presentation in the 5th decade.

Gender distribution: Most reports in the literature suggest a slight male predominance of 1.5:1.⁶ In our present study, we also observed male predilection of ratio M: F = 4:1.

Clinical features: The most common presenting symptom of PBL is pain in the long bone that is unrelieved by rest. Patients also presented with palpable mass, swelling limb, night pain, pathological fracture and neurological symptoms. Our retrospective study revealed that pain was the most presenting feature followed by swelling. One patient presented with pathological fracture.

Site of involvement: In our study, long bones are involved in all cases involving metaphysis. When compared to other literature, long bones were more commonly involved site in NHL bone.^{6,7}

Diaphysis of bone was involved in 3 cases and metaphysis was involved in 7 cases. Long bone were involved in 9 cases (5 cases in femur, 3 cases in tibia, 1 case in humerus) and 1 case in pelvis.

DLBCL is the most common type of NHL which accounts for 55% of all NHL in Indian population.⁸ DLBCL is characterised by the proliferation of large neoplastic B cell, with Nuclear size equal to or exceeding normal macrophage nuclei or more than twice the size of a normal lymphocyte that has a diffuse growth pattern. DLBCL comprises centroblastic, immunoblastic, T-cell/Histiocyte rich and anaplastic morphological variant.⁹ Although most primary bone lymphoma are DLBCL with a rare occurrence of follicular, marginal zone, anaplastic large cell, hodgkin and T-cell lymphoma.

Most PBDLBCL show diffuse growth pattern. Lymphoma cell permeate between the trabeculae and medullary fat. The lymphoma consists of diffuse sheets of large atypical cells or a

mixture of small to large cell with large multi lobated nuclei, fine chromatin, and inconspicuous to prominent nucleoli (**Figure 1**) which was confirmed by IHC (**Figure 2**).

The ALCL tumor consist of large cell with pleomorphic nuclei and prominent multiple nucleoli (**Figure 3**). Most lymphoma are positive for CD30 and some of T-cell markers, and CD45 and EMA (**Figure 4**).

Differential diagnosis: Differential diagnoses for PBL was considered for chronic osteomyelitis, primary bone sarcoma, leukemic infiltrate, including Ewing sarcoma, mesenchymal chondrosarcoma, metastatic neuroblastoma, and small-cell osteosarcoma, metastatic sarcomas/ carcinoma/melanoma.

Chronic osteomyelitis: The mixed cell infiltrate of tumour cell and clinico-radiological appearances help to differentiate lymphoma from diagnosis of chronic osteomyelitis. Moreover CD30 and EMA will be negative in osteomyelitis.

Ewing sarcoma: On IHC, CD 99 showed negativity and CD45, CD30, EMA positivity in our case, ruled out ES.

Mesenchymal Chondrosarcoma: Absence of chondroid differentiation S-100 negativity and CD45 & CD20 positivity help to differentiate lymphoma from diagnosis of Mesenchymal chondrosarcoma.

Metastatic carcinoma/Metastatic melanoma: Both the tumours were ruled out as Keratin and S-100 negative and CD30 positive on IHC.

However, the finding in the present study like DLBL as more common variant among primary bone lymphoma was similar to the finding observed by X Frank Zhao et. al¹⁰, Dong F et. al¹¹, Hayase E et. al², Dai Maruyama et. al¹ and Desai et. al¹² (**Table 1**).

Table 1 Percentage of PBL (DLBCL) in our study compared with other studies

Different studies	DLBCL (%)	Total lymphoma case
X. Frank zhao et. al (2015)	10(100%)	10
Dong F et. al(2015)	11(84.6%)	13
Hayase E et. al(2015)	11(64.7%)	17
Dai Maruyama et. al (2007).	19(68%)	28
Desai et. al.(1991)	17(68%)	25
Present study	9(90%)	10

Primary bone ALCL are uncommon, only a few case reports and a small case series have been reported in the literature.^{13, 14} In our retrospective study we reported only 1 case as primary ALCL with clinico-radiological correlation. Most PBDLBCLs are treated with combined radiotherapy and chemotherapy with good prognosis.¹⁵

CONCLUSION

The present study revealed that Diffuse large B-cell lymphoma is the commonest primary bone lymphoma. CT, MRI of the chest, abdomen and pelvis is an important diagnostic point for Primary bone lymphoma. Hence clinico-pathological (HPE and immunohistochemistry) and radiological correlation played an important role in the retrospective analysis of such rare tumour.

Conflict of Interest: There is no conflict of interest associated with this work.

Ethical Clearance: Taken.

REFERENCES

- Maruyama D, Watanabe T, Kobayashi TBY, Kim SW and Tanimoto K. Primary bone lymphoma: a new and detailed characterization of 28 patients in a single-institution study. *Jpn. J. Clin. Oncol* 2007;37(3):216-223.
- Hayase E, Kurosawa M, Suzuki H, Kasahara K, Yamakawa T, Yonezumi M, Suzuki S and Teshima T. Primary bone lymphoma: a clinical analysis of 17 patients in a single institution. *Acta Haematol* 2015;134:80-85.
- Rosai and Ackerman's Surgical Pathology. 10th edition. Edinburgh (United Kingdom): Mosby Elsevier; 2011.
- Oberling C. Les reticulosarcomes et les reticuloendotheliosarcomes de la moelle osseuse (sarcomes d'Ewing). *Bull Assoc Fr Etude Cancer. (Paris)* 1928;17:259-96.
- Parker F and Jackson H. Primary reticulum cell sarcoma of bone. *Surg Gynecol Obstet* 1939;68:45-53.
- Bhagavathi S and Fu K. Primary Bone Lymphoma. *Arch Pathol Lab Med* 2009;133(11):1868-1871.
- Heying FH, Hogendoorn PCW, Kramer MHH, Hermans J, Kluin-Nelemans JC, Noordijk EM and Kluin PM. Primary non-Hodgkin's lymphoma of bone: a clinicopathological investigation of 60 cases. *Leukemia* 1999;13:2094-2098.
- Nimmagadda RB, Digumarti R, et al. Histopathological pattern of lymphomas and clinical presentation and outcomes of DLBCL: A multicenter registry based study from India. *Indian J Med Paediatr Oncol* 2013;34:299-304.
- Gurbuxani S, et al. DLBCL - More than a diffuse collection of large B cells: An entity in search of a meaningful classification. *Arch Pathol Lab Med* 2009;133:1121-34.
- Zhao XF, Young KH, Frank D, Goradia A, Glotzbecker MP, Pan W et al. Pediatric primary bone lymphoma—diffuse large B-cell lymphoma: morphologic and immunohistochemical characteristics of 10 cases. *Am J Clin Path* 2007;127:47-54.
- Dong F, Chen YP, Wang JJ, Jing HM, Ke XY, Zhongguo shi yan xue ye xue za zhi/ Zhongguo Bing li Sheng li xue hui. Clinical analysis of 13 patients with primary bone lymphoma. *J Exp Hematol* 2015;23(2):420-424.
- Desai S, Jambhekar NA, Soman CS and Advani SH. Primary lymphoma of bone: A clinicopathologic study of 25 cases reported over 10 years. *J Surg Oncol* 1991;46(4):265-269.
- Nagasaka T, Nakamura S, Medeiros LJ, Juco J, Lai R. Anaplastic large lymphoma presented as bone lesions: a clinicopathological study of six cases and review of literature. *Mod Pathol* 2000;13(10):1143-1149.
- Gudgin E, Rashbass J, Pulford KJ, Erber WN. Primary and isolated anaplastic large cell lymphoma of the bone marrow. *Leuk Lymphoma* 2005;46(3):461-463.
- Beal K, Allen L, Yahalom J. Primary bone lymphoma: treatment results and prognostic factors with long term follow up of 82 patients. *Cancer* 2006;106(12):2652-2656.

ORIGINAL PAPER

Knowledge and attitude towards mental illness- A comparative study among rural and urban college students

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ABSTRACT

Introduction: With 356 million in the age of 10-24 years; India has the world's largest youth population despite having a smaller general population than China. **Methods:** A descriptive and comparative study design was undertaken amongst 200 college students. The sampling technique adopted for the study was stratified random sampling. **Results:** 22% of the rural college students have inadequate knowledge towards mental illness followed by 73% having moderate level of knowledge; whereas 10% of urban college students have inadequate knowledge, followed by 64% having moderate knowledge level towards mental illness. Only 5% of rural students had adequate knowledge compared to 26% of urban college students having adequate knowledge regarding mental illness. 77% of the rural college students and 60% of urban college students have a moderate attitude level towards mental illness whereas, only 10% of the rural students had favourable attitude as compared to 28% urban students having favourable attitude towards mental illness. Knowledge and attitude of the students towards mental illness were found to be significantly associated with the location of the colleges (rural and urban) ($p < 0.01$). A significant positive correlation has been found between the knowledge and attitude scores ($p < 0.01$). Knowledge of the respondents was found to be associated with stream of education, educational status of the parents, occupational status of father, monthly income of the family and source of mental health information. Attitude of the respondents were found to be associated with stream of education, occupational status of father, monthly income of the family and source of mental health information. **Conclusion:** The study findings suggest the need of proper awareness programmes among the student community, which would help dispel any myths and misconceptions regarding mental illness.

Keywords: Knowledge, attitude, mental illness

INTRODUCTION

Mental illness is common, affecting more than 25% of all people at some time during their lives. They are also universal, affecting people in all countries and societies, individuals of all ages, women and men, the rich and the poor, from urban and rural environment. They have an economic impact on societies and on the quality of life of individuals and families.¹ In India among the total population, 72.22% of the people live in rural areas and 27.78% in urban area. Among these adults between the age group of 15-59 years forms 56.9% of the total population.² The prevalence of mental disorders in India is high, as in other parts of the world.³ It was estimated that at least 58/1000 people have a mental illness and about 10 million Indians suffer from severe mental illness.^{4,5} In rural India, prevalence rates for all mental illness is 64.4 per 1000 population and urban part of the country it is 66.4 per 1000 population.⁶ A latest UN report said that developing countries with large youth population could see their economics soar, provided they invest heavily in young people's education and health and protect their rights.⁷

OBJECTIVES

1. To assess, compare and to determine the relation between the knowledge and attitude towards mental illness among the college students of selected rural and urban colleges.
2. To find out the association between socio-demographic variables and knowledge and attitude towards mental illness among the college students of selected rural and urban colleges.

METHODOLOGY

A descriptive and comparative research design was carried out

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upon 200 college students: 100 students from rural college and 100 from urban college from Ist yr, II yr and III yr degree courses in arts, science and commerce stream with due informed consent. Stratified random sampling technique was used to select the students who fulfilled the inclusive criteria. The study was conducted in Khowang College (rural college), situated around 16 kms away from Dibrugarh town, Assam and in DHSK College (urban college) in the month of July 2015. A questionnaire was used which consists of Socio-demographic characteristics and self structured knowledge questionnaire.

The data analysis was consisted of descriptive and inferential statistics, the statistical tests used were Chi square test, Karl Pearson's correlation coefficient, t- test and F- test. The significance level used was $p < 0.05$.

RESULTS

Among the rural college students, the mean age was found to be 18.91 years with a SD of 1.093 years, whereas, the mean age among urban college students is found to be 19.45 years and SD of 1.038 years.

In the present study, 5% of the rural college students had adequate knowledge, 73% had moderate level and 22% had inadequate level of knowledge on mental illness, whereas 26%, 64% and 10% of the urban college students had adequate, moderate and inadequate level of knowledge on mental illness. The difference in knowledge on mental illness between the rural and urban college students was found to be statistically significant (Table-1).

A significant difference was observed in the attitude level between the rural and urban college students. 10% of the rural college students had favourable attitude, 77% had moderate level and 13% had unfavourable attitude towards mental illness in comparison to 28%, 60% and 12% of the urban college students respectively (Table-1).

Table 1 Knowledge and Attitude towards mental illness among the rural and urban college students

Variable		Rural	Urban	p-value
		No. (%)	No. (%)	
Knowledge Level	Adequate	5 (5%)	26 (26%)	$p < 0.001$
	Moderate	73 (73%)	64 (64%)	
	Inadequate	22 (22%)	10 (10%)	
Attitude Level	Favourable	10 (10%)	28 (28%)	$p < 0.01$
	Moderate	77 (77%)	60 (60%)	
	Unfavourable	13 (13%)	12 (12%)	

Comparison of mean of the knowledge and attitude scores revealed significant differences between the scores of the rural and urban college students for all the components of mental illness except S & S of Mental illness and Causes of Mental illness (Table 2).

The correlations between the components of knowledge and components of attitude in rural and urban college students were presented in Table 3. In most of the components a significant positive correlation were observed.

Table 2 Comparison of Knowledge and Attitude Scores between Rural and Urban colleges

Variables	College	Scores		p-value
		Mean	SD	
Meaning of Mental illness	Rural	3.38	1.40	0.001
	Urban	4.24	1.43	
Types of Mental illness	Rural	3.02	1.49	0.001
	Urban	4.09	1.74	
S&S of Mental illness	Rural	1.89	1.02	0.845
	Urban	1.92	1.13	
Causes of Mental illness	Rural	1.19	1.01	0.143
	Urban	1.40	1.01	
Treatment of Mental illness	Rural	5.20	2.25	0.01
	Urban	6.07	2.34	
Knowledge Score	Rural	14.70	4.86	0.001
	Urban	17.72	5.37	
Acceptance Score	Rural	53.81	5.78	0.001
	Urban	57.03	7.97	
Response Behaviour Score	Rural	18.50	1.97	0.001
	Urban	20.52	2.81	
Attitude Score	Rural	72.30	6.95	0.001
	Urban	77.67	9.39	

Table 3 Correlations between sub areas of knowledge and attitude

		Acceptance Score		Response Behaviour Score		Attitude Score	
		Rural	Urban	Rural	Urban	Rural	Urban
Meaning of Mental illness	<i>r</i>	0.320	0.212	0.059	0.145	0.284	0.248
	<i>p-value</i>	0.001	0.034	0.561	0.15	0.004	0.013
Types of Mental illness	<i>r</i>	0.279	0.393	0.165	0.379	0.281	0.460
	<i>p-value</i>	0.005	0.001	0.100	0.001	0.005	0.001
S&S of Mental illness	<i>r</i>	0.049	0.285	0.023	0.169	0.049	0.289
	<i>p-value</i>	0.626	0.004	0.824	0.093	0.631	0.003
Causes of Mental illness	<i>r</i>	-0.087	0.068	-0.023	.309	-0.077	0.14
	<i>p-value</i>	0.39	0.503	0.822	0.002	0.446	0.164
Treatment of Mental illness	<i>r</i>	0.169	0.249	0.219	0.337	0.205	0.304
	<i>p-value</i>	0.093	0.012	0.029	0.001	0.041	0.002
Knowledge Score	<i>r</i>	0.250	0.365	0.169	0.401	0.259	0.435
	<i>p-value</i>	0.012	0.001	0.093	0.001	0.009	0.001

The present study revealed that knowledge of the respondents was significantly associated with the stream of education, educational status of their parents, occupational status of father, monthly income of the family and source of mental health information. Attitude of the respondents were found to be associated with stream of education, occupational status of father, monthly income of the family and source of mental health information (Table 4 and Table 5).

Table 4 Knowledge and attitude differential across the source of Mental Health Information

Variables		Knowledge Score			Attitude Score		
		Mean	SD	p-value	Mean	SD	p-value
Source of Mental Health Information	Health personnel	14.89	4.972	0.001	75.15	7.843	0.019
	TV / Radio/ Cinema	16.49	4.864		74.47	8.346	
	Newspaper / Magazine / Books	17.71	5.069		75.39	9.445	
	Relatives / Family Members	15.06	4.736		74.94	10.133	
	Friends / Neighbors	11.20	5.718		77.40	11.082	
	No Prior Information	15.15	5.678		72.74	7.246	
Multiple Response		20.72	3.847		81.67	9.184	

Table 5 Knowledge and attitude differential across socio-demographic variables

Variables		Knowledge Score			Attitude Score		
		Mean	SD	p-value	Mean	SD	p-value
Age Group	Upto 20 years	16.38	5.287	0.189	75.09	8.865	0.620
	> 20 years	14.76	5.629		74.10	6.920	
Gender	Male	16.28	5.478	0.838	74.89	8.731	0.866
	Female	16.12	5.176		75.10	8.646	
Educational Status	TDC Yr I	15.87	6.023	0.662	75.02	8.644	0.537
	TDC Yr II	16.63	3.768		75.96	9.893	
	TDC Yr III	16.48	5.196		74.02	7.506	
Stream	Arts	15.01	5.081	<0.001	74.41	8.023	0.020
	Science	19.19	5.041		77.42	9.712	
	Commerce	17.30	4.111		70.20	9.151	
Educational Status of Father	Professional Degree	15.57	5.543	0.042	72.00	9.397	0.210
	Graduate/Postgraduate	17.75	4.977		76.98	9.935	
	Intermediate/Diploma	16.94	5.684		76.94	8.333	
	High School	15.79	5.515		74.25	8.070	
	Middle School	12.46	3.992		72.15	6.162	
	Primary School	15.37	4.913		74.68	7.775	
Educational Status of Mother	Illiterate	16.00	5.774	0.002	71.25	2.500	0.999
	Professional Degree	13.29	5.992		73.86	9.442	
	Graduate/Postgraduate	17.67	4.958		74.93	9.788	
	Intermediate/Diploma	23.17	3.312		74.00	6.450	
	High School	15.68	5.446		74.97	8.474	
	Middle School	16.84	3.746		75.84	9.094	
Occupation of Father	Primary School	15.11	4.999	0.006	74.74	7.709	0.011
	Illiterate	13.77	5.464		75.46	8.800	
	Professional	15.43	4.860		73.29	9.447	
	Govt. Service	17.85	5.418		77.63	9.175	
	Pvt. Service	17.24	6.379		75.59	10.081	
	Business	15.40	5.289		74.33	7.980	
Occupation of Mother	Agriculture	15.49	4.398	0.257	73.63	7.474	0.23
	Unemployed	12.50	4.703		69.07	6.673	
	Professional	14.00	4.781		71.63	9.226	
	Govt. Service	17.91	4.686		73.44	9.581	
	Pvt. Service	15.00	9.274		81.00	8.406	
	Business	14.78	5.652		73.44	6.167	
Monthly Income of the Family	Agriculture	15.18	4.945	0.006	73.32	7.631	0.047
	Unemployed	16.29	5.414		75.93	8.693	
	>= Rs. 20000	17.35	5.400		76.14	9.142	
	Rs. 10,000- 19999	17.44	5.073		77.06	9.439	
	Rs.7500-9999	17.67	4.899		76.22	11.606	
	Rs. 5000-7499	13.52	4.996		75.05	7.473	
Type of Family	Rs. 3000-4999	15.88	5.076	0.286	73.58	7.621	0.660
	Rs. 1001-2999	14.81	5.049		73.38	8.229	
	< Rs. 1001	13.50	4.861		69.50	3.804	
Any Family History of MI	Nuclear	16.59	5.466	0.009	75.36	8.874	0.086
	Joint	15.93	4.971		74.67	8.227	
	Extended	14.56	5.501		73.50	9.011	
Distance to nearest Health Centre	Yes	10.67	0.816	0.317	69.00	3.464	0.054
	No	16.38	5.322		75.17	8.722	
	Upto 5 Km	16.38	5.319		75.50	8.661	
	> 5 Km	15.34	5.404		72.28	8.348	

DISCUSSION

The finding of adequate level of knowledge among urban college students (26%) compared to (5%) rural college students may be due to the better access to both print and electronic media as evident by the response of the urban college students in the socio-demographic data regarding source of mental health information. Similar findings were reported by Amy C Watson et al,⁸ where they found that students had some understanding of mental illness as a problem of the brain with biological and psychosocial causes. The finding of 28% urban college students

having favourable attitude towards mental illness as compared to the finding of 10% rural college students can be related to the finding of a positive correlation between knowledge and attitude towards mental illness. Similar findings were reported by Sushrut Jadhav et al,⁹ who found a more liberal and tolerant attitude towards mental illness among the urban Indians than rural Indians having more stigmatizing attitudes in contrast to the findings of Mahto RK, Verma PK, Verma AN et al,¹⁰ who did not find any significant level of difference between male and female students' attitude regarding mental illness. Better knowledge is often reported to result in improved attitudes towards people with mental illness and a belief that mental illnesses are treatable can encourage early treatment seeking and promote better outcomes.¹¹ The study finding of a significant difference between knowledge and attitude of rural and urban college students is supported by the findings of Vijay P More et al,¹² who found a significant difference between knowledge and attitude of urban and rural adults. However, no significant difference between knowledge and attitude score was found between rural and urban family members of mentally ill patients; also no correlation was found between knowledge of both rural and urban family members by Gogoi K and Baruah A.¹³ A significant association of knowledge and attitude with the socio-demographic variables of stream of education, occupational status of father, monthly income of the family, source of mental health information among rural and urban respondents regarding mental illness at $p < 0.05$ was found in the present study, as was seen in the findings of Mahto RK, Verma PK, Verma AN et al.¹⁰ The findings of a significant association of knowledge with demographic variables of educational status of parents, family history of mental illness among urban respondents was supported by Farid F Youssef et al,¹⁴ who found higher knowledge score among those people who knew someone with a mental illness. The finding of a significant association of knowledge demographic variable of economic status and educational status among urban respondents is also supported by the findings of Vijay P More.¹² Though no significant association was found among the knowledge and attitude with the demographic variable of age, sex, educational status, type of family and distance to nearest health centre in the present study; it has been found through research that opinion about mental illness plays vital role in long-term care of mentally ill patients and people frame,¹⁵ a picture about mental illness and mentally ill patients in their mind, which generally guides their behaviour, so public must be educated to bring about positive changes in attitude.

Conclusion: The findings of 26% adequate knowledge score among urban college students followed by 5% knowledge score among the rural college students indicates the need for educational programmes to be implemented in the collegiate program to equip the younger generation with adequate knowledge, which would develop favourable attitude towards mental illness, which is essential for the better treatment and follow up of mental illness.

The present study also suggests the need of proper awareness programmes among the student community, which would help dispel any myths and misconceptions regarding mental illness.

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Ethical clearance: Taken.

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Contribution of authors: I declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

REFERENCES

1. Sreevani R. A Guide to Mental Health and Psychiatric Nursing. 2nd ed. New Delhi: Jaypee Brothers; 2009. p. 2—9.
2. Lalitha K. Mental Health and Psychiatric Nursing. Bangalore: Gajanana Publishers; 2000.p. 244.
3. Kermode M, Bowen K, Arole S, joag K, Jorm AF. Community beliefs about causes and risks for mental disorders: A mental health literacy survey in a rural area of Maharashtra, India. *Int J Soc Psychiatry* 2010;56:606-22.
4. Math SB, Chandrashekar CR, Bhigra D. Psychiatric Epidemiology in India. *Indian J Med Res* 2007;126:183-192.
5. Khandelwel SK, Jhingan HP, Ramesh S, Gupta RK, Srivastava VK. India Mental Health Country Profile. *Int Rev Psychiatry* 2004;16:126-41.
6. S Murali MS, Epidemiological study of prevalence of mental disorders in India, *Indian Journal of Community Medicine* 2001;26(4):10-2.
7. India has World's largest Youth population: UN Report PTI Nov. 18, 2014.
8. A.C. Watson et al. *Oxford Journals Medicine Schizophrenia Bulletin*;30(3):563-572.
9. Jadhav Sushrut, Littlewood Roland. Stigmatization of Severe Mental Illness in India: Against the simple Hypothesis. *Indian Journal of Psychiatry* 2007 Jul-Sept;49(3):189—194.
10. Mahto RK, VermaPK, VermaAN. Et al. Students' Perception about Mental Illness: *Indian Journal of Psychiatry* 2007;32(3):198—200.
11. Stuart H, Arboleda-Florez J. Community attitudes towards people with schizophrenia. *Can J Psychiatry* 2001;46:245-52.
12. Vijay P More, PravinKumar B. Jadhav, Ravindra Puranik, Vitthal S. Shinde, Sandeep Pakhale. *International Journal of Health Sciences & Research* Aug 2012;2(5): 12-14.
13. Gogoi Kunjalata, Baruah Arunjoyoti. Mental Illness: Knowledge of Family Members in Rural & Urban Areas in Assam Jan 2011;11(1):40-45.
14. Farid F Youssef, Raecho Bachew, Dalecia Bodie, RichannaLeach, Kevin Morris, Glenderia Sharma. Knowledge and Attitudes towards Mental Illness Among College Students: Insights into the Wider English- Speaking Caribbean Population. *International Journal of Social Psychiatry* Feb 2014;60(1):47-54.
15. Song LY, Chang LY, Shih CY, Lin CY, Yang MJ. Community Attitudes Towards the Mentally Ill: The Results of a National Survey of the Taiwanese Population. *International Journal of Social Psychiatry* 2005;51(2):162—176.

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ORIGINAL PAPER

Trochanteric fractures treated with PFLCP versus DHS

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ABSTRACT

Background: Trochanteric fractures can be treated successfully with conventional implants, such as sliding hip screws, cephalomedullary nails, angular blade plates, and rarely by a primary hip arthroplasty. The Dynamic Hip Screw (DHS) is one of the most widely used implant for stabilization of intertrochanteric fractures. The Proximal Femoral Locking Compression Plate (PFLCP) is a relatively newly introduced implant for trochanter fractures, and there is no sufficient literature comparing DHS and PFLCP. **Objective:** (1) Compare the operative differences, clinical and radiological outcomes between the trochanter fractures treated by DHS with those treated by PFLCP. **Methods:** We studied 52 patients admitted and followed up at GMCH. 26 patients with trochanter fractures were treated with DHS, and 26 patients with PFLCP. **Results:** The mean operative time and average intra-operative blood loss was more in the PFLCP group when compared with DHS group and it was found to be statistically significant ($p < 0.05$). DHS group had marginally better functional results than PFLCP group. There was no difference in the radiological outcome between two groups. **Conclusions:** In trochanteric fractures of femur, both PFLCP and DHS provide excellent results. Functional outcome is more influenced by quality of fracture reduction, rather than the type of implant used.

Keywords: Trochanteric fractures, PFLCP, DHS, implants

INTRODUCTION

Trochanteric fractures are usually the fractures of older population. They account for 45% of total hip fractures.¹ With the increase in average life expectancy; the proximal femoral fractures have been marked as one of the biggest problems of the contemporary civilization. Various operative procedures with different implants have been described for the treatment of intertrochanteric fractures. The long list of devices is itself a testimony that none of the devices is ideal to treat all types of fractures in this region. The Dynamic Hip Screw (DHS) is one of

the most widely used implant for intertrochanteric fractures, which has stood the test of time. However, comminuted unstable fractures, fractures with extension into piriformis fossa, and combined intracapsular and extracapsular fractures treated with DHS are generally prone to complications.² The Proximal Femoral Locking Compression Plate (PFLCP) was introduced in the 21st century as a new implant that allows angular – stable plating for the treatment of complex comminuted and osteoporotic fractures. The PFLCP is a newer addition in the array of implants for proximal femur fractures.

However, there is scarcity of literature comparing DHS with PFLCP in the treatment of intertrochanter fractures. Hence, we conducted a Randomised control study to evaluate the operative procedures, clinical outcomes and radiological outcomes in trochanteric fractures treated with DHS and PFLCP

PATIENTS/METHODS

We conducted a Randomised control study in the Department of Orthopaedics of Gauhati Medical College and Hospital, Guwahati from December 2011 to December 2013.

The inclusion criteria were:

1. Only those who gave consent.
2. Adult patients (Age > 18 years)

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3. Closed trochanteric fractures.
4. Competent neurological and vascular status of the affected limb.
5. Ipsilateral knee, Ankle, contralateral hip joint functionally good enough, not to exert a serious adverse effect on the rehabilitation process.
6. Only patient with a near normal daily activities of life.
7. No associated fracture in same limb
8. Patients who can meet the medical standards for routine, elective surgery.

The study included 52 patients, admitted either through the outpatient or emergency department of the hospital. 26 patients were operated with DHS and other 26 with PFLCP.

The subjects were randomized using online statistical computing web program - <http://www.randomization.com/>

All patients were admitted. The levels of fracture were determined and were classified according to AO. The patient was prepared for elective surgery after performing the routine preoperative investigations and pre anaesthetic evaluation. Spinal anaesthesia was given to the patients and closed reduction done using fracture table and C-arm. Once acceptable reduction was achieved, the operative part was scrubbed, painted and draped for surgery. Standard lateral approach incising the iliotibial band and splitting the vastus lateralis parallel to the skin incision was used to expose the trochanter. As per the randomization data for that particular case, DHS or PFLCP was used to stabilize the fracture after achieving good reduction (**Figures 1 and 2**). The procedure and techniques were followed as per the AO guidelines. The procedures were performed confirming AP and lateral images using C-arm. After the implantation, 14 size negative suction drain was put and the tissues were closed in layers.

Sitting up in bed, Quadriceps exercise and range of movement exercises of the hip and knee started on the first day after surgery within limits of pain. The general supportive measures were taken and stitches were removed on tenth post operative day. Early ambulation was encouraged usually after 5-6 days. Depending on the age, fracture pattern, stability of fracture fixation, toe touching to partial weight bearing was allowed till first follow up (6 wks). Then unprotected full weight bearing was allowed after reviewing radiograph. Follow up was carried out at 6, 12, 16, 24 weeks and then at two monthly intervals. All statistical analyses were conducted with SPSS for windows (version 18.0, Chicago, IL), and p values of <0.05 were considered significant.



Figure 1 PFLCP pre-op and post-op



Figure 2 DHS pre-op and post-op

RESULTS

The youngest patient was of 23 yrs and the oldest was 78 yrs of age. The mean age was 55.84 years. The male to female ratio was found to be 1.6:1. The fractures were more commonly encountered on the left side (53.84%). The commonest mode of injury in our patient was fall on ground (63.46%). The other modes were – road traffic accident (RTA), fall from height and assault. The fractures were classified according to AO classification system (1979). Most of the cases (75%) were operated in 3-7 days following injury. The mean time interval between trauma and surgery was 5 days.

The mean operative time of surgery in the PFLCP group was found to be 93.07 minutes and in the DHS group was found to be 57.69 minutes. The above two values were tested statistically by unpaired t test. The p value was 0.00427, which is statistically significant. The average blood loss in the PFLCP group was found to 305.76 ml and in the DHS group was found to be less, 230.65 ml. The above two values were tested statistically by unpaired t test. The p value was 0.000317, which is statistically significant.

Harris Hip Scoring system was used to evaluate the functional result in our study. We obtained excellent result in 59.61% of cases, good result in 26.93% of cases, fair in 9.61% of cases and poor result in 3.84% of cases in the total study group. No mortality was recorded in our series. Superficial wound infection was seen in 2 cases of PFLCP and 1 case in DHS group. The difference in the functional result between the two groups was not statistically significant.

The criteria of Anderson et al (1975) were taken into account to assess the union of the fracture. The union rate was 100% in the PFLCP group, with no delayed or non unions in the study, and there was 1 case of non union in DHS group. The time taken for union in the PFLCP group ranged from 15 to 22 weeks (mean 18.03 wks). The time taken in the DHS group for radiological union ranged from 15 to 22 weeks, (mean of 17.56 wks). There was 1 case of Implant cutout, Medialization and Nonunion each, in DHS group. Varus deformity was seen in 2 cases of PFLCP and 1 in DHS group (**Figure 3**).

**Figure 3** Complications

PFLCP Superficial infection	DHS non-union	PFLCP varus malunion	DHS screw cutout
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DISCUSSION

Agreement has been achieved on the significance of restoring stability and early mobilisation during the treatment of pertrochanteric fractures. Although DHS is one of the standard treatments, high failure rates of sliding hip screws in unstable fractures have been reported. The PFLCP has been introduced as a new implant that allows angular – stable plating for the treatment of complex comminuted and osteoporotic fractures.

In our study, the mean operative time in the PFLCP group (93.07 min) and In the DHS group was 57.69 min. The above two values were tested statistically and the difference was found to be statistically significant (p -value was 0.00427 (**Table 1**)).

Table 1 Mean Operative Time

Authors	Year	Operation	Mean Time (Min.)
Bridle ³ et al.	1991	DHS	42.5
Goldhagen et al. ⁴	1994	DHS	47
O'Brien et al. ⁵	1995	DHS	47
Habernek et al.	2000	DHS	27
Little et al. ⁶	2008	DHS	40.4
Guo-Chun Zha ⁷	2011	PFLCP	35.5
Present study	2013	PFLCP	93.07
		DHS	57.69

The increased operative time with PFLCP is may be because the surgeon is handling a new technique with new implant.

There have been a few studies in literature that have estimated the amount of blood loss. Little et al⁶, Guo-Chun Zha et al⁷ studied the intra operative blood loss in DHS and PFLCP. The average blood loss in the PFLCP group was found to be 305.76 ml, and in the DHS group was found to be less, i.e., 230.65 ml. The above two values were tested statistically and the difference was found to be statistically significant (p -value was 0.000317) (**Table 2**).

Table 2 Average Intra-Operative Blood Loss

Authors	Intra Operative Blood Loss
Little et al ⁶ (2008) DHS	160ml
Guo-Chun Zha et al ⁷ (2011) PFLCP	150ml
Present study ——— > PFLCP	305.76 ml
———— > DHS	230.65 ml

Functional results of the procedures were evaluated using Harris Hip Scoring System. In the PFLCP group, excellent results were in 53.84% of cases, good results in 34.61%, fair results in 7.69% and poor result in 3.84% cases each. In the DHS group, excellent results were in 65.38% of cases, good result in 19.28% of cases, fair result in 11.53% and poor result in 3.84% cases each. Kyle et al ¹(1979) obtained good to excellent result in 89% (**Table 3**).

Table 3 Functional Results

Authors	Excellent and Good Functional Result
Kyle et al ¹ (1979)	89%
P. Kamboj MS et al (2007)	80%
Present study PFLCP	88.45%
DHS	84.66%

When we compare our series to previously done studies regarding functional result, we find comparable result.

There were 2 cases of superficial wound infection in PFLCP group and 1 case in DHS group in our study. We find increased rate with PFLCP group , probably because of increased operative time and increased blood loss (**Table 4**).

Table 4 Post-Operative Infection

Authors	Implants	Infection Rate
Larsson et al ⁸ (1990)	DHS	1.8%
Birdle et al (1991)	DHS	3.9%
Butt et al ⁹ (1995)	DHS	4%
Hebernek et al (2000)	DHS	2.4%
Guo-Chun Zha et al ⁷ (2011)	PFLCP	1.81%
Present study	PFLCP	7.69%
	DHS	3.84%

Union of the fractures - The criteria of Anderson et al were taken into account to assess the union rate of the fracture. All the fractures in PFLCP group and 25 cases in DHS group united within 6 months of follow up, with an average of 17.8 weeks. The two groups were tested using the unpaired t test. The p value was 0.185, which is considered insignificant. When we compare our series to previously done studies regarding union of fracture, we find comparable result (**Table 5**).

Table 5 Time For Union

Authors	Implants	Union time
Rao et al ¹⁰ (1983)	DHS	18 weeks
Birdle et al (1990)	DHS	24 weeks
Nakata et al ¹¹ (1994)	DHS	10.6 weeks
Habernek et al (2000)	DHS	12 weeks
Present study	PFLCP	18.03 weeks
	DHS	17.56 weeks

Most authors reported no cases of non union in their series (Boldin et al¹², Tyllianakis et al¹³, Fogagnolo et al¹⁸, Ulfen et al). However, Gadegone et al¹⁹ had one case of non union out of 100. Kamboj et al also reported 1 case of non union and 2 cases of delayed union out of 30 cases in their series. Guo-Chun Zha et al⁷ reported 1 case of nonunion in 110 patients treated by PFLCP. We encountered 1 case of non union in DHS group and no case in PFLCP group.

Limitations: Our study had few limitations. The study was limited to 52 subjects with 26 in each group, and we would wish to recommend a study with a larger group and a longer duration to have a better evaluation of the outcome. The surgeon was new to the operative techniques and principles of PFLCP, whereas he was well versed using a DHS. Hence there could be a technical bias favoring DHS. A future study at a later date when the surgeon becomes used to PFLCP, would negate this bias. The study included patients only from the northeast who have different demographic characteristics, and the results cannot be applied to whole of India. A multicentre study involving different regions of India, would be desirable to be applied to a larger population.

CONCLUSION

In Trochanteric fracture of femur, the two groups of implant, PFLCP and DHS provides excellent results in terms of fracture union as well as functional outcome. In our study there were marginally better functional results of DHS than that of PFLCP. But these differences could not be stressed much, due to small sample size and the difference was statistically insignificant. Both the implants- PFLCP and DHS are associated with low but comparable complications. The average operative time and intra operative blood loss was more in the PFLCP group compared to the DHS group and it was found to be statistically significant. A thorough knowledge of the concept, features and the procedure of application of PFLCP is very important.

Conflicts of interest: None.

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to

claims relating to the content of this article will be borne by the authors.

Ethical clearance: Taken from Institutional Ethical Committee.

REFERENCES

- Kyle RF, Gustillo RB, Premer RF. Analysis of six hundred and twenty two intertrochanteric hip fractures. J Bone J Surg 1979;61-A:216.
- Hasenboehler EA, Agudelo JF, Morgan SJ, Smith WR, Hak DJ, Stahel PF. Treatment of complex proximal femoral fractures with the proximal femur locking compression plate 2007 Aug;30(8):618-23.
- Bridle SH, Patel AD, Bircher M, Calvert PT. Fixation of intertrochanteric fractures of the femur- A randomized prospective comparison of the Gamma nail and the Dynamic hip screw. JBJS 1991;73-B:330-334.
- O'Brien PJ, Meek RN, Blachut PA, Broekhuysen HM, Sabharwal S. Fixation of intertrochanteric hip fractures-gamma nail versus dynamic hip screw, a randomized prospective study. Canad Jr Surg 1995;38(6):516-520.
- Little NJ, Verma V, Fernando C, Elliott DS, Khaleel A. A prospective trial comparing the Holland nail with dynamic hip screw in the treatment of intertrochanteric fractures of the hip. JBJS 2008;90 –B(8):1073-1078.
- Guo-Chun Zha a,b, Ze-Lin Chen b, Xiao-Bo Qi b, Jun-Ying Sun. Treatment of pertrochanteric fractures with a proximal femur locking compression plate. Injury, Int J Care Injured 2011;42:1294–1299.
- Butt MS, Krikler SJ, Ali MS. Comparison of dynamic hip screw and gamma nail-a prospective randomized controlled trial. Injury 1995;26(9):615-618.
- Nakata K, Ohzono K, Hiroshima K, Toge K. Serial change of sliding in intertrochanteric femoral fractures treated with sliding screw system. Arch Orthop Trauma Surg 1995;113:276-280.
- Boldin C, Seibert FJ, Fankhauser F, Peicha G, Grechenig W, Szyzskowitz R. Acta Orthop Scand 2003;74(1):53-8.
- Tyllianakis M, Panagopoulos A, Papadopoulos A, Papasimos S, Mousafirios K. Treatment of extracapsular hip fractures with the proximal femoral nail (PFN): long term results in 45 patients. Acta Orthop Belg 2004;70(5):444-54.
- Fogagnolo F, Kfuri M, Paccola CA. Intramedullary fixation of pertrochanteric hip fractures with short AO-ASIF proximal femoral nail. Arch Ortop Trauma Surg 2004;124(1):31-7.
- Gadegone W, Salphale Y. Proximal femoral nail- an analysis of 100 cases of proximal femoral fracture with an average follow up of 1 year. Int Orthop 2007;31(3):403-408.
- Nordin Bin Simbak..Mechanical failure of DHS fixation in intertrochanteric fracture of the femur.Medical Journal of Malaysia 2007;56 Suppl D12-7.
- Sudhir S Babhulkar. Management of trochanteric fractures. Indian Journal of Orthopaedics 2006;40(4):210-218.
- P Niemeyer. Principles and clinical application of the Locking Compression Plate(LCP). Acta Chirurgiae Orthopaedicae 2006;73:221-228.
- Khaloudin Sinno. The effectiveness of primary bipolar arthroplasty in treatment of unstable intertrochanteric fractures in elderly patients. North American Journal of Medical Sciences 2007;2(12): 561-568

ORIGINAL ARTICLE

Perception of medical students on lecture methods: Power Point or Chalkboard?

Sarma Dipak Kumar*

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ABSTRACT

Aim: Using chalkboard is a traditional method of lecture delivery. Use of power point is relatively new. Modern day teaching is always learner oriented. This study was aimed to assess perceptions of undergraduate students on these methods of lecture delivery in learning surgery. **Methods:** Study was done in a teaching hospital over a period of six months. Theory classes of 5th semester in surgery were taken alternately by using chalkboard and power point. At the end of the term students' perception was assessed on the basis of a questionnaire in Likert scale regarding lecture content, ability to take note, ability to take diagram, interesting nature of lecture, and advancement in understanding, stimulation of interest, clarity and understandability of lecture, clarity of work, audibility and on organization of lecture. **Results:** Favorable responses to chalkboard and power point were- informative content (72.2% & 92.6%), ability to take notes (66.67% & 79.63%), take diagram (67.6% & 71.3%), interesting nature of lecture (75% & 74.07%), advancement of student's understanding on subject (83.33% & 81.48%), stimulation of interest (77.78% & 62.96%), understandability (76.85% & 83.33%), clarity (58.33% & 85.19%), audibility (82.41% & 87.04%) and organization of presentation (79.63% & 83.33%). **Conclusion:** Medical students preferred power point over chalk and talk in terms of its informative content, ability to take notes and clarity of the presentation. Chalkboard scored over power point in developing interest in the subject and in advancing the students' understanding on the subject. A combination of both methods could be valuable.

Keywords: Perception, Medical Students, Lecture, Chalkboard, Power Point, surgery

INTRODUCTION

Lecture delivery is a common mode of teaching known since the medieval period in Christian and Muslim universities.¹ The primary aim of lecture delivery is to increase understanding and retention

of concept of the subject. Blackboards were used as a tool in teaching science and medicine from the nineteenth century.¹ Because of advancement of technology new tools are now available. Amongst them are 35-mm slide projector, transparencies with an overhead projector (OHP) and Microsoft Power Point presentation (PPT).^{2,3} While attending a lecture a student uses both his visual and auditory senses to grab information.³ All these tools including traditional blackboard presentation fulfill this criterion.

In learning process electronic tools of teaching are gaining popularity day by day. The initially popular overhead projector and 35- mm slide projector are rarely used now a day. Power point presentation is now commonly used as a teaching tool in delivery of lecture.⁴ The efficacy of these tools in learning process has been observed from the teacher's point of view in many studies.⁵⁻⁸ Many other studies observed the effectiveness from learner's perspectives. There is no study available from this region on the perception of undergraduate students on these two tools of lecture delivery in learning surgery. Therefore this study is planned with an aim to find out the perceptions about these two common tools used in medical institutions for undergraduate teaching.

METHODS

The study was conducted in the department of surgery of a medical college in Assam. Didactic lectures for fifth semester students were taken weekly for a period of six months using chalk and board and power point presentation alternately. At the

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end of the term the students were asked to fill up a questionnaire made specifically for this purpose. There were ten questions which enquired about their views and perception on the methods of the lecture delivery, viz. Chalk and Board and PowerPoint presentation. The questionnaire was taken from an earlier study done by Seth et al.⁹ A five point 'Likert Scale' was used to record their responses against each question as Strongly disagree-1, Disagree-2, Neither agree nor disagree-3, agree-4 and strongly agree-5.¹⁰ The questions were-

Lecture content is informative

I can take my notes

I can take diagrams

The lecture is interesting

The lecture advanced my understanding on the subject

Lecture stimulated my interest

Lecture is clear and understandable

Board work/PP work clear

Lecture is audible

Lecture is organized

Students were briefed about the questions and interviewed in relevance to the questionnaire. The responses were collected without having the responder's name or any identification sign in it. Responses were analyzed against each parameter and the preference of the student is measured by method of weighted average regarding both the methods of lecture delivery.

RESULTS

One hundred and fourteen students participated in the study. The questionnaire was found to be incompletely filled up by six students. They were excluded from the study and a total number of 108 students were included in the study. There were 65 males and 43 females. Likert scale 5 and 4 were considered as favorable response to the question concerned in relation to chalkboard or Power Point presentation.(Table-1)

Table1 Responses in Likert scale

Questions	Chalk and Board					Power Point				
	LS-1	LS-2	LS-3	LS-4	LS-5	LS-1	LS-2	LS-3	LS-4	LS-5
Lecture content informative	1	8	21	37	41	0	3	5	52	48
I can take my notes	1	17	18	48	24	2	9	11	60	25
I can take diagrams	0	18	17	49	24	0	18	13	53	24
The lecture is interesting	0	11	16	33	48	0	7	21	56	24
The lecture advanced my understanding on the subject	3	2	13	47	43	0	5	15	62	26
Lecture stimulated my interest	1	8	15	46	38	0	14	26	52	16
Lecture is clear and understandable	0	10	15	45	38	0	1	17	56	34
Board work/PP work clear	5	20	20	38	25	0	4	12	58	34
Lecture is audible	2	5	12	44	45	0	4	10	46	48
Lecture is organized	0	13	9	49	37	0	5	13	43	47

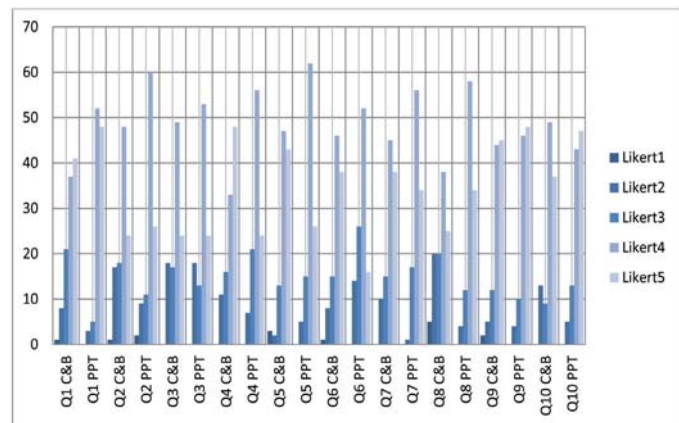


Figure 1 Responses to questions in Likert scale

The medical students preferred power point over chalk and talk in terms of its informative content, taking notes from the presentation and clarity of the presentation. It had a slight edge over Chalk and Board in terms of taking diagram, understandability, audibility and organization of the presentation. On the other hand students preferred Chalk and Board over Power Point presentation in terms of stimulating the interest of the student on the subject. Chalk and Board had a slight edge in terms of its interesting nature of the lecture and advancement of the students' understanding on the subject (Table 2, Figure 1).

Table 2 Favorable responses to chalk and board and power point presentation

Questions	Chalk & Board (favorable response) Number & % of students	Power Point (favorable response) Number & % of students
Lecture content informative	78(72.2%)	100(92.6%)
I can take my notes	72(66.67%)	85(78.7%)
I can take diagrams	73(67.6%)	77(71.3%)
The lecture is interesting	81(75%)	80(74.07%)
The lecture advanced my understanding on the subject	90(83.33%)	88(81.48%)
Lecture stimulated my interest	84(77.78%)	68(62.96%)
Lecture is clear and understandable	83(76.85%)	90(83.33%)
Board work/PP work clear	63(58.33%)	92(85.19%)
Lecture is audible	89(82.41%)	94(87.04%)
Lecture is organized	86(79.63%)	90(83.33%)

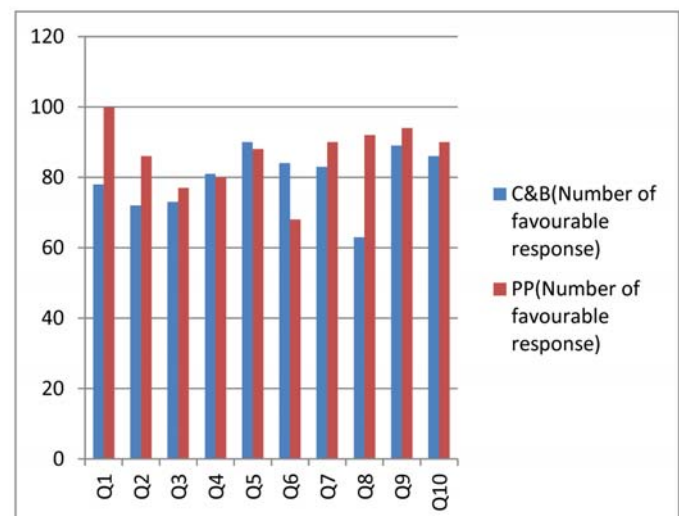


Figure 2 Comparison of favorable responses to chalk and board (C&B) and power point presentation (PP)

DISCUSSION

Modern teaching learning process is more learners oriented. That is why it is necessary to know about students' perception in regard to different tools used in lecture delivery system. The 35-mm slide projector was once popular. But, it is now heading towards extinction.⁹ The use of TOHP is also gradually decreasing. Instead the use of power point presentation is gradually increasing. Some studies show that the learner prefers chalk and presentation over PPT presentation.¹¹⁻¹⁵ On the other hand some studies show that the students prefer PPT presentation over Chalk and Board presentation.^{9, 16-19} A study showed equal preference by the students to both methods.¹⁹ Preference to combined methods was highest in some studies.^{21,22}

Lectures are efficient means of providing knowledge and concepts to a large group and the students should receive information from the lectures. In this study power point (92.6%) was found to be better than chalk and board (72.2%) in this regard. Studies show that most of the students felt that chalk and board was ineffective in demonstration of clinical conditions and in covering more subject per lecture.^{14, 23} It is seen that power point can cover more subject per lecture.^{14, 16, 23} Summarization is better in power point presentation.^{14, 23} On the other hand chalk and board provide less diagrams and information. In another study the learners have shown preference to use of mixed tool (55.1%) over chalk and board (9.2%), overhead projector (20.4%) and power point presentation (15.3%).²⁴

Ability to take notes in a class is an important factor for the learner. It helps in revision of the class and future studies. In this study it was seen that power point presentation is better than chalk and board presentation from the viewpoint of the learner (79.63% vs. 66.67%). Lalvarmawi F et al found that students preferred power point over chalk and board in taking notes.¹⁶ Petimani and Adake found preference of power point over chalk and board (51% vs. 46.9%).²³ A clear preference to chalkboard (80%) in taking notes was seen in one study.²⁴ In a study done by Saha N et al students considered mixed aid (51%) as best in taking notes followed by overhead projector (25.5%), power point (13.3%) and chalk board (10.2%).²¹ The commonly cited reason for preference to power point is legibility of the notes. The main reasons for liking chalk and board was because it allowed sufficient time to take down notes and power failure did not interrupt a lecture like it does in a power point presentation.⁶

Students considered ability to take diagram from the presentation as an advantage. Students preferred power point presentation in our study for this purpose. But, the difference in preference was not high (71.3% vs. 67.6%). Lalvarmawi F et al showed students' preference to power point.¹⁶ Petimani and Adaki showed preference for chalk and board in taking diagrams.²³ Saha N et al showed that students preferred power point presentation (28.6%) over chalk and board (6.1%) for better perception of diagram although in his list overhead projector preference (41.8%) was highest.²¹ Shaguphta T Sheikh showed that 81.65% of the students preferred chalk and board for copying diagrams. But, 81.3% of students felt that for demonstration of three dimensional figures power point presentation is better.¹⁴

For a student if the lecture is interesting learning becomes easier. Parvin R et al observed that students felt that lecture was more interesting with chalk and board.²⁵ It was because a teacher could use some extempore method in chalk and board method.²⁵ In this study chalkboard was preferred over power point in this regard. But, the difference was very minimum (75% vs. 74.07%).

Student prefer chalk and board for advancing the understanding on the subject as it contained natural pause and break during writing and rubbing the board which allows the students to follow the material and take down the notes.⁷ A study conducted in Bangalore during 2011-2012 considered blackboard teaching as most satisfactory because students can follow the teaching and understand the concept effectively.¹³ In our study students preferred chalk and board for advancement in learning. But, the difference with power point presentation was minimum (83.33% vs. 81.48%). Florence et al and Amame HS et al showed students' preference to power point over chalk and board teaching.^{16, 26}

The delivery of the lecture should be effective in stimulating the interest in the learner. The method of lecture delivery plays a great role in this regard. In this study chalk and board was preferred by the students over power point presentation (77.78% vs. 62.96%). Studies showed that students preferred chalk and board because it facilitated the interaction between the teacher and the student.^{14, 23} Saha N et al showed that students felt that stress on important points could be given by the teacher more in chalkboard presentation (46.9%) than power point (10.2%), overhead projector (10.2) or mixed aid presentation (32.7%).²¹ Petimani and Adake found that students preferred chalk and board over power point (77.5% vs. 22.04%) in stimulating their interest.²³ A chalkboard presentation allows spontaneity, flexibility, and nonlinearity.⁹ A chalkboard presentation is helpful to follow and a good eye contact with the teacher stimulates interest.²⁵ Some studies have shown that the interactive features of blackboard have the potential to enhance the learning experience.²⁷ Garg et al commented that power point reduces the interactive discussion between teacher and students.²⁸

In this study power point presentations were preferred by students as they were clear and understandable, though the difference with chalk and board was minimum (83.33% vs. 76.85%). Preference to power point was seen studies done by Lalvarmawi F et al and Amame HS et al.^{16, 26} Preference to chalkboard for its clarity and understandability was observed by Petimani and Adaki.²³ Saha N et al showed that for understanding the lecture topic chalkboard (12.2%) and overhead projector (12.2%) were preferred than power point presentation (5.1%), although the use of mixed aid (70.4%) topped his list.²¹

In this study students preferred power point presentation over chalkboard for clear work of the presentation (85.19% vs. 58.33%). This observation was also seen in other studies.^{25, 26} Teacher's bad handwriting is a major cause of low preference to chalkboard presentation.^{25, 29}

Student preferred power point presentation over chalk and board on the audibility of the lecture. The difference is minimum (87.04% vs. 82.41%). This was also observed in the study of Amame HS et al.²⁶ Though the audibility mainly depends on teacher's personal capability power point presentation perhaps gives relief from the distraction from repeated writing and rubbing on the board.

The students felt that a power point presentation is slightly more organized than chalkboard in our study (83.33% vs. 79.63%). It was also observed in other studies.^{16, 26} Petimani and Adake observed student's perception towards chalk and board in organizing the lecture.²²

The overall preference of students was towards power point presentation in this study. This highlights the importance of using technology into the classroom. This was observed in many such similar studies done in last decade.^{9, 16-19, 24, 29} The study showed that medical students preferred power point over chalkboard in terms of its informative content, ability to take

notes and clarity of presentation. It had an edge over chalkboard in terms of taking diagram, understandability, audibility and organization of presentation.

Chalkboard was preferred by the students as a method of lecture delivery in many studies.^{6,11,14-15,25} In this study, the students showed preference to chalkboard over Power Point presentation in terms of stimulating the interest on the subject. Chalkboard had a slight edge over power point in terms of interesting nature of lecture and advancement in understanding the subject.

The results of the present study suggest that both the tools of teaching have some strength and limitations. In a study majority of students opined that both the lecture delivery methods should be used simultaneously in the class.⁷ Combination of both the methods were suggested in some studies.^{21,22,29,30}

CONCLUSION

The medical students preferred power point over chalk and talk in terms of its informative content, ability to take notes and clarity of the presentation. It had a slight edge over chalkboard in terms of taking diagrams, understandability, audibility and organization of the presentation. On the other hand students preferred chalkboard over power point presentation in terms of stimulating the interest of the student on the subject. Chalkboard scored over power point in developing interest in the subject and also in advancing the students' understanding on the subject.

This study highlighted the importance of using power point presentation in the classroom. At the same time it showed that students' perception on chalkboard in some areas were favorable. A combination of both these methods could be valuable.

Conflicts of interest: None declared.

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Ethical clearance: Not required.

REFERENCES

- Brown G, Atkins M. Studies of lecturing. In Brown G, Atkins M. Editors. *Effective Teaching in Higher Education*. London & New York: Routledge; Taylor & Francis e Library (eBook edition); 2002:7-18.
- Seth V, Upadhyaya P, Ahmad M, Kumar V. Impact of various lecture delivery methods in pharmacology. *Exp Clin J* 2010;9:96-101.
- Sahu DR, Supe AN. The art and science of presentation: 35-mm slides. *J Postgrad Med* 2000;46:280-285.
- Prasad S, Roy B, Smith M. The art and science of presentation: Electronic presentations. *J Postgrad Med* 2000;46:193-19.
- Seth V, Upadhyaya P, Ahmad M and Kumar V. An assessment of teachers' preference for lecture delivery methods in medical education. *Educational Research and Review* 2010; 5 (9):533-7
- deSa SB, Keny MS. Power point versus chalkboard based lectures in pharmacology: Evaluation of their impact on medical student's knowledge and their preferences. *Int J Adv Health Sci* 2014;1(5):10-1.
- Biswas S, Mondal S, Mukharjee J. Impact of Electronic and Non-Electronic Teaching Methods in Medical Physiology. *Indian Medical Gazette* 2013;147(12):431-33
- Waheeda S, Murthy KS. A comparative study of blackboard teaching with PowerPoint teaching in 1st year medical students. *National Journal of Basic Medical Sciences* 2015;6(1):11-13.
- Seth V, Upadhyaya P, Ahmad M, Moghe V. Power point or chalk and talk: Perceptions of medical students versus dental students in a medical college in India. *Adv Med Educ Pract* 2010;1:11-16.
- Gail M. Sullivan, Anthony R. Artino, Jr. Analysing and interpreting data from Likert type scales. *J Grad Med Educ* 2013;5(4):541-542.
- Roy B, Banerjee I, Sathian B, Mondal M, Kumar SS, Saha CG. Attitude of basic science medical students towards medicine and surgery post graduation: A questionnaire based cross sectional study from western region of Nepal. *Nepal Journal of Epidemiology* 2010;1(4):126-34.
- Sawant SP. Power point versus chalkboard: Impact on the medical student. *International Journal of Pharmacology Research* 2015;5(3):282-85
- Priyadarshini KS, Shetty HV, Reena R. Assessment of different teaching aids and teaching methods for the better perception of biochemistry by 1st MBBS students. *J Eval Med Dent Sci* 2012;1:1159-65.
- Shaguptha TS. Teaching Learning aids in medical education: The students perspective. *Int J Clin Surg Adv* 2015;3(1):32-37
- Banerjee I, Jauhari A C, Bista D, Johorey A C, Roy B, Sathian B. Medical Students view about the integrated MBBS course: A questionnaire based cross-sectional survey from a medical college of Kathmandu valley. *Nep J Epidemiol* 2011;1(3):95-100.
- Lalvarmawi F, Ningthoujam S, U, N, Mishra M. Perception of postgraduate students on teaching aids. *J Med Soc* 2013;27:36-8.
- Swati C, Suresh, T, and Sachin D. Student assessment on learning based on power point versus chalkboard. *International J of recent trends in science and technology* 2014;13:347-51.
- Mishra H, Kumar V, Modi PK. Comparison of different teaching methodologies in a medical college in North India. *Indian journal of basic and applied medical research* 2013;2(6):464-69.
- Manohar T, Dashputra A, Suresh C. Students' perception about teaching learning media in didactic lectures. *JETHS* 2015;2(3):103-5.
- Baxi SN, Shah C J, Parmar RD, Parmar D, Tripathi CB. Student's perception of different teaching aids in a medical college. *Afr J Health Prof Educ* 2009;1(1):15-6.
- Saha N, Tripura K, Das R. Students' Opinion towards audio-visual aids used in lecture classes. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 2015;14(4):96-100.
- Chaudary R, Dullo P, Gupta U. Attitude of 1st MBBS medical students about two different visual aids in physiology lectures. *Pak J Physiol* 2009;5(2):16-19.
- Petimani MS, Adake P. Blackboard versus power point presentation: Students opinion in medical education. *Int J Educ Psychol Res* 2015;1(4):289-92.
- Jabeen N, Ghani A. Comparison of the traditional chalk and board lecture system versus power point presentation as a teaching technique for teaching gross anatomy to the first professional medical students. *JEMDS* 2015;4(11):1811-17.
- Parvin R, Md Haque N, Ahmed N, Ahmed R, MI, Ara R, Rahman MM, Bhattacharjee S, Bhattacharjee S, Rafiqueuddin AKM. Is audio visual method better than traditional for medical students? A survey report. *Bangladesh J Med* 2010;21:60-4.
- Amane HS, Kaore SN, Vasvani SV. Evaluation of existing teaching methods used for lecture classes in pharmacology. *Int J Pharm Bio Sci* 2013;4(1):193-8
- Heirdsfield A, Walker S, Tambyah M, Beutel D. Blackboard as an online learning environment: What do teacher education students and staff think?. *Aust J Teach Educ*. 2011;36:1-17.
- Garg A, Rataboli PV, Muchandi K. Students' opinion on the prevailing teaching methods in pharmacology and changes recommended. *Indian J Pharmacol* 2004;36:155-158.
- Harley KN, Jankar J, Mohod KM. Perception of first MBBS medical students towards different teaching aids used in teaching learning process: A comparison between power point versus chalkboard teaching. *Int J Adv Res Biol Sc* 2015;2(7):71-80.
- Prabhu R, Pai KM, Prabhu G, Shrilatha. A lecture in medical physiology: PowerPoint versus chalkboard. *South East Asian Journal of Medical Education* 2014;8(1):72-76.

ORIGINAL PAPER

Study of Vitamin-D status in patients with low backache

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ABSTRACT

Introduction: Apart from its established role in calcium homeostasis, studies have found vitamin D to be very much important for the normal maintenance and functioning of the muscles and nerves. **Aims:** i) To study the vitamin D levels in patients of low back ache ii) compare it with a control population. **Methods:** The study was designed as a case control study, with 100 cases and 100 controls. Patients with complaint of low backache were included in the study. A sample of venous blood was collected for vitamin D estimation. **Results:** In this study mean vitamin D level in the case group was found to be 29.19 ng/ml and in the control group 38.45ng/ml. P- value was found to be <.0001. Vitamin D deficiency and insufficiency was found more in females than males in both groups. 77.5% of the female patients and 45% of male patients had below normal vitamin D levels. **Conclusion:** There is a high possibility that vitamin D deficiency has a role to play in the aetiology of low backache.

Keywords: Hypovitaminosis D, myopathy, pro-inflammatory, skeletal, supplementation.

INTRODUCTION

Low backache is one of the most common presenting complaints of patients visiting the Neurology, Neurosurgery and Orthopedics Outdoor clinics. The definition of chronic low back pain has been standardized and is defined as a clinical syndrome characterized with pain localized in the area below the costal margins and above the inferior gluteal folds.¹ Low back pain is experienced by most individuals at some point of time and is one of the commonest health reasons given for work loss.² In upto 80% of the patients the exact cause cannot be ascertained by the physician.³ In the diagnosed cases, lumbar Prolapsed Intervertebral Disc Lesion (PIVD) comes out as the most common etiology. PIVD may be caused by osteoporosis which may in turn be the outcome of vitamin D deficiency.

The role of vitamin D in healthy development of bones is well established. Research on this important nutrient is now concentrated on its non-classical actions. Studies have found this vitamin to be very much important for the normal maintenance and functioning of the muscles and nerves and Vitamin D deficiency has been linked with myopathy, aches and pains in many studies.⁴ Studies have also shown that vitamin D deficiency is associated with increased incidence of inflammation being directly linked with anti-inflammatory cytokines.^{5,6}

Till the last century vitamin D deficiency was not thought to be prevalent by the physicians or contribute to a disease process except for rickets and osteomalacia. But recent studies carried on in different parts of the world have reported a high prevalence of vitamin D deficiency in different study populations.⁷⁻⁹ India though is located in the tropical zone, receiving ample amount of sunlight, the prevalence of vitamin D deficiency has been found to be very high in all age groups and both sexes.¹⁰⁻¹¹ Besides studies showing vitamin D deficient status among patients suffering from low back ache, chronic musculoskeletal pain or other neurological diseases in comparison to controls,¹²⁻¹⁴ there are research works which have shown that supplementation of vitamin D results in alleviation of symptoms in these disease processes.¹⁵

So vitamin D deficiency may either play a proinflammatory role or by virtue of its role in calcium homeostasis, deficient status of

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this vitamin may cause skeletal deformities in the vertebral column resulting in pain. Taking the findings of these research studies into consideration and also noting the high prevalence of vitamin D deficiency in patients of low back pain visiting the OPDs, and alleviation of pain brought about by vitamin D supplementation, this study was planned to study the vitamin D levels in patients of low back ache and compare it with a control population under a standard protocol, so that the practical findings can be tabulated and presented for the benefit of the patient population.

METHODS

Study Design and duration: The study was designed as a case control study to be completed within a period of one year.

Study population: A total number of 100 patients irrespective of gender and age, who visited neurology OPD with complaints of back pain was selected as cases after considering the exclusion and inclusion criteria. Similarly 100 controls were selected from the attendants of the patients, volunteers in the department of Neurology and Biochemistry. Informed consent was taken both from the cases and controls.

Place and time of study: The study was conducted in the department of Neurology and Central Clinical Laboratory, Biochemistry Section of Gauhati Medical College & Hospital from December 2015 to September 2016.

Inclusion Criteria: Cases: Patients attending Neurology OPD with complaints of low backache. **Controls:** (1) Healthy attendants of the patients. (2) Volunteers in the department of Neurology and Biochemistry not suffering from backache.

Exclusion Criteria: Cases:

1. Patients who had a mechanical cause for the backache.
2. Patients suffering from infectious diseases like Tuberculosis.
3. Patients with known renal impairment or chronic liver disease.
4. Patients suffering from Primary/ Metastatic bone disease.
5. Patients suffering from autoimmune disease.
6. Patients taking vitamin D supplements, using sun blocks.
7. Patients on drugs like antitubercular drugs.
8. Pregnant & lactating women.

Controls: (1) Persons taking vitamin D supplements, using sun blocks (2) Pregnant & lactating women.

Study Methodology: Cases were selected from among the patients who visited neurology OPD with complaints of backache. After obtaining informed consent from the patient a thorough history was taken and general as well as neurological examination done. The required data and the relevant examination findings were noted down in a questionnaire. The patients were then sent to Central Clinical Laboratory-Biochemistry Section, where a venous blood sample was collected for vitamin D, Calcium and Phosphorus estimations.

Analysis of samples: The venous blood samples were promptly centrifuged and serum was separated and stored at -20°C until the time of analysis. Serum 25(OH)D was estimated using the Vitros 25(OH)D total reagent pack on the Vitros ECiQ Immunodiagnostic System. A competitive immunoassay

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technique is used which involves the release of the 25(OH)D in the sample from the binding protein using a low pH denaturant and the subsequent competition of the free 25(OH)D with HRP labelled 25(OH)D reagent for the monoclonal anti-vitamin D bound to the wells. Calibration of the reagent was done every 28 days and one level of control was run with each batch of assay. Calcium and phosphorus was estimated in Vitros 4600 Chemistry System using dry slide technology and reflectance spectrophotometry.

Definition of vitamin D levels¹⁶:

- i) Vitamin D deficient – 25(OH)D < 20 ng/ml.
- ii) Vitamin D insufficient – 25(OH)D – 20–<30 ng/ml.
- iii) Vitamin D normal – 25(OH)D– 30-100 ng/ml.

Statistical Analysis: Data are presented as mean \pm standard deviation. Student's t test was used to compare the data. Pearson's coefficient was calculated to study the correlation between vitamin D and calcium and vitamin D and phosphorous. $P < 0.05$ was considered significant.

RESULTS & OBSERVATIONS:

Table 1 Demographic and biochemical profile of study cases and controls

	CASES(n=100)		CONTROLS(n=100)		
	Mean \pm SD	Range	Mean \pm SD	Range	p-value
Age(years)	46.99 \pm 14.54	17-77	35 \pm 12.43	21-43	<.0001***
Male : Female	60 : 40	-	56 : 44	-	-
Body mass index (kg/m ²)	23.09 \pm 4.12	16.5-32.5	21.6 \pm 3.24	16.07-29.5	0.0049**
25 OH Vit D(ng/ml)	29.19 \pm 15.92	<8-94.4	38.45 \pm 13.21	13.8-81	<.0001***
Calcium (mg/dl)	9.08 \pm 0.69	7.1-10.7	9.26 \pm 0.56	7.9-10.3	0.0442*
Phosphorous (mg/dl)	3.91 \pm 0.59	2.7-5.2	3.68 \pm 0.45	2.9-4.7	0.0022**

***-Extremely significant, **-Very significant, *Significant

Table 2 Vitamin D status in cases and controls

		Male	Female	Total
Deficient	Cases	12	13	25
	Controls	2	1	3
Insufficient	Cases	15	18	33
	Controls	5	19	24
Normal	Cases	34	8	42
	Controls	42	31	73

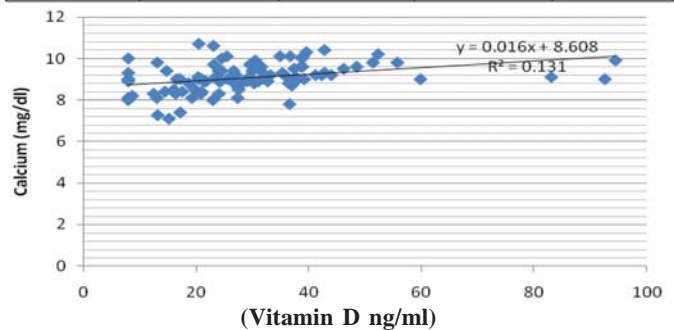


Figure 1 Correlation of calcium with vitamin D in low back pain patients (n=100)

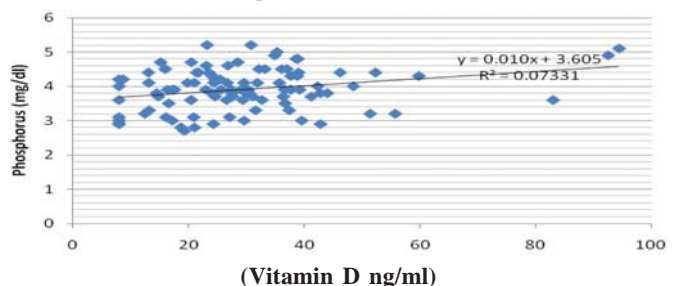


Figure 2 Correlation of phosphorous with vitamin D in low back pain patients (n=100)

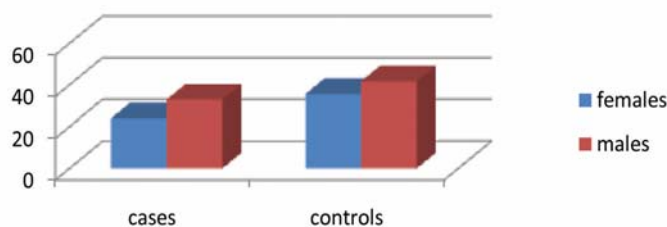


Figure 3 Comparison of Vitamin D levels between males and females in both cases and controls.

DISCUSSION

Low backache is the most common reason for medical consultation. It is a leading cause of disability and interferes with the quality of life and work performance. In many cases anatomic defect as a cause is not detected. In cases where anatomic defect is the cause of low backache, the anatomic defect may be the outcome of vitamin D deficiency resulting in deranged calcium-phosphorous metabolism.¹⁷⁻¹⁹ however chronic pain is one of the many conditions which have been recently associated with vitamin D deficiency. Also vitamin D being responsible for calcium homeostasis and bone metabolism, it is highly possible that low vitamin D levels may result in muscle weakness and abnormalities in bone metabolism leading to back pain.²⁰

Before 2000, vitamin D deficiency was not known and doctors also did not consider it as a cause of any medical problem. But with changes in the life style of people limiting outdoor activity, and with availability of new technology to measure vitamin D, vitamin D deficiency has emerged as a global phenomenon. Several Neuronal cells, and muscle cells have been found to express vitamin D receptors. This explains that vitamin D plays a role in the normal metabolism and function of these cells. Measurement of total 25-OH Vitamin D, because of its long life and it being the major circulating form, provides the best assessment of a person's vitamin D status. A serum level of 40-60 ng/ml is believed to be optimum for skeletal and non-skeletal functions and levels upto 100ng/ml is considered safe.²¹

In the present study the case group consisted of more males than females, in the ratio of 6:4. As was hypothesized that low levels of vitamin D may be responsible for low backache, it was found that the level of vitamin D in case group subjects was significantly low with a p-value of < 0.001 , when compared with the control group. As expected in hypovitaminosis D, calcium level was also found to be significantly low in the case group when compared with control group, (9.08 vs 9.26, $p=0.0442$). Recent studies have come up with similar findings of significantly low vitamin D levels in patients suffering from chronic low backache.²²⁻²⁴ Studies done on other cases of chronic pain have also come forward with similar findings.²⁵⁻²⁷ Also there are follow up studies which have reported that more than 90% of patients with pain and muscle weakness responded to treatment with vitamin D supplement.^{15,28} Schreuder et al, in a study reported a positive effect of vitamin D supplementation in patients with non-specific musculoskeletal pain.²⁹

In this study vitamin D deficiency and insufficiency was found to be more in females as compared to males both in the case and control group. 77.5% of the female patients suffering from low backache had below normal vitamin D levels, whereas 45% of

male patients had low levels of vitamin D. In the control group percentage of low vitamin D levels in females was 43.48 and males was 12.96. However the mean vitamin D levels did not differ significantly between males and females in both the study groups. In most studies the status of vitamin D has been noted to be low in females as compared to males. This may be considered the result of females mainly remaining indoors limiting their exposure to sunlight. However data on sun exposure though collected could not be properly analysed. Also regarding diet 95% of the study participants, both case and control were non-vegetarians, ruling out the diet related deficiency of vitamin D. Consensus has not been established regarding levels of vitamin D in males and females, as there are studies where vitamin D deficiency has been found to be more in males in comparison to females.^{23,30}

The role of vitamin D in different disease processes has recently received great interest with the discovery of vitamin D receptors in many tissues of the body. A number of studies have suggested a link between low levels of vitamin D and higher incidence of chronic pain in different patient populations like rheumatology patients, women with low back pain during child bearing period, patients with non-specific musculoskeletal pain and with lumbar spinal stenosis.²⁵⁻²⁷ Furthermore studies on association of latitude and season of the year with pain have provided indirect evidence of the importance of low vitamin D levels on the aetiology of pain.³¹⁻³² More specifically hypovitaminosis D has been linked to chronic low back pain in many studies conducted in different parts of the world. The exact pathogenic mechanism of low back pain in patients with low vitamin D levels has not been arrived at, but several hypotheses have been laid forward. High levels of inflammatory markers have been found in people with low vitamin D levels, signifying that vitamin D is anti-inflammatory.^{33,34} People with low vitamin D levels are more susceptible to inflammation in the vertebral end plates resulting in low backache. Also adequate levels of vitamin D are necessary for the continuous regeneration of nerve cells. Chronic vitamin D deficiency has been found to result in osteoporosis, osteomalacia, and increased risk of falls.³⁵ In a study by TH Kim et al, it was found that severe back pain and leg pain was associated with higher incidence of osteoporosis and higher level of bone resorption marker (serum CTx).³⁶

Studies have not only revealed a high prevalence of vitamin D deficiency in patients presenting with chronic low backache but several of such follow-up studies have shown that replacement therapy with vitamin D in patients suffering from chronic low backache of unknown aetiology and with low levels of vitamin D resulted in remarkable relief of symptoms.

CONCLUSION

In conclusion it can be said that this study revealed a significant difference of vitamin D levels between cases of low backache and normal controls, with chronic low backache patients having low levels of the vitamin. Vitamin D deficiency was also found to be more in females as compared to males. So although the exact pathogenic mechanism implicating low vitamin D in low backache is still not clear, vitamin D measurement can be made a part of the investigation protocol and clinicians may try with replacement therapy in low vitamin D status patients for alleviation of symptoms.

Conflict of interest: None declared.

Ethical clearance: Taken.

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REFERENCES

- Dionne CE, Dunn KM, Croft PR, Nachemson AL, Buchbinder R, Walker BF, et al. A consensus approach towards the standardization of back pain definitions for use in prevalence studies. *Spine* 2008;33:95-103.
- Wadell G, Burton AK. Occupational health guidelines for the management of low back pain at work: evidence review. *Occupational Medicine* 2000;51(2):124-35.
- Deyo RA. Diagnostic evaluation of LBP-reaching a specific diagnosis is often impossible. *Arch Intern Med* 2002;162:1444-7.
- Ali JMM. Vitamin D deficiency in outpatient department: eastern province of KSA experience. *Rawal Med J* 2010;35:221-3.
- Schleithoff SS, Zittermann A, Tenderich G et al. Vitamin D supplementation improves cytokine profiles in patients with congestive heart failure: a double-blind randomized, placebo-controlled trial. *Am J Clin Nutr* 2006;83:754-9.
- D'Ambrosio D, Cipitelli M, Cocciolo MG, Mazzeo D, Di Lucia P, Lang R et al. Inhibition of IL-12 production by 1,25-dihydroxyvitamin D3. Involvement of NF-kappa B down regulation in transcriptional repression of the p40 gene *J Clin Invest* 1998;101:252-62.
- Holick MF, Chen TC. Vitamin D deficiency: a worldwide problem with health consequences. *Am J Clin Nutr* 2008;87:1080S-6S.
- Arabi A, El Rassi R, El-Hajj Fuleihan G. Hypovitaminosis D in developing countries-prevalence, risk factors and outcomes. *Nat Rev Endocrinol* 2010;6:550-61.
- Van der Meer IM, Middelkoop BJ, Boeke AJ, Lips P. Prevalence of vitamin D deficiency among Turkish, Moroccan, Indian and sub-Saharan African populations in Europe and their countries of origin: An overview. *Osteoporos. Int* 2011;22:1009-21.
- Harinarayan CV, Joshi SR. Vitamin D status in India-Its implications and Remedial Measures. *J Assoc Physicians India* 2009;57:40-8.
- Zargar AH, Ahmad S, Masoodi SR, Wani AI, Bashir MI, Laway BA et al. Vitamin D status in apparently healthy adults in Kashmir valley of Indian subcontinent. *Postgrad Med J* 2007;83(985):713-6.
- Plotnikoff GA, Quigley JM. Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. *Mayo Clin Proc* 2003;78(12):1463-70.
- McCarty DE, Reddy A, Keigley Q, Kim PY, Cohen S, Marino AA. Nonspecific pain is a marker for hypovitaminosis D in patients undergoing evaluation for sleep disorders: a pilot study. *Nat Sci Sleep* 2013;5:37-42.
- Al Faraj S, Al Mutairi K. Vitamin D deficiency and chronic low back pain in Saudi Arabia. *Spine (Phila Pa 1976)* 2003;28(2):177-9.
- Rao Ch R, Maruthi W. Study of Beneficial Role of Vitamin D in Chronic Low Back Pain. *Paripex-Indian J of Research* 2015;4(7):68-70.
- Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab* 2011;96(7):1911-30.
- Atherton K, Berry DJ, Parsons T, Macfarlane GJ, Power C, Hyppönen E. Vitamin D and chronic widespread pain in a white middle-aged British population: evidence from a cross-sectional population survey. *Annals of the Rheumatic Diseases* 2009;68(6):817-22.
- Benson J, Wilson A, Stocks N, Moulding N. Muscle pain as an indicator of vitamin D deficiency in an urban Australian Aboriginal population. *Medical Journal of Australia* 2006;185(2):76-7.
- Lotfi A, Abdel-Nasser AM, Hamdy A, Omran AA, El-Rehany MA. Hypovitaminosis D in female patients with chronic low back pain. *Clinical Rheumatology* 2007;26(11):1895-1901.
- Simonelli C. The role of vitamin D deficiency in osteoporosis and fractures. *Minn Med* 2005;88:34-6.
- Bischoff-Ferrari HA, Giovannucci E, Willett WC, Dietrich T, Dawson-Hughes B. Estimation of optimal serum concentrations of 25-hydroxyvitamin D for multiple health outcomes. *Am J Clin Nutr* 2006;84(1):18-28.
- Lodh M, Goswami B, Mahajan RD, Sen D, Jajodia N, Roy A. Assessment of vitamin D status in Patients of Chronic Low Back Pain of Unknown Etiology. *Ind J Clin Biochem* 2015;30(2):174-9.
- Ghai B, Bansal D, Kapil G, Kanukula R, Lavudiya S, Sachdeva N. High Prevalence of Hypovitaminosis D in Indian Chronic Low Back Patients. *Pain Physician* 2015;18:E853-E862.
- Kalra S, Kalra B, Khandelwal SK. Vitamin D status in patients with musculoskeletal symptoms in Haryana. *Indian J Med Nutr Nutraceut*. 2012;1:50-3.
- Plotnikoff GA, Quigley JM. Prevalence of severe hypovitaminosis D in patients with persistent, non-specific musculoskeletal pain. *Mayo Clin Proc* 2003;78:1463-70.
- Stoll D, Dudler J, Lamy O, Hans D, So A, Krieg MA et al. High prevalence of hypovitaminosis D in a Swiss rheumatology outpatient population. *Swiss Med Wkly* 2011;141:W13196.
- Lofti A, Abdel-Nasser AM, Hamdy A, Omran AA, El-Rehany MA. Hypovitaminosis D in female patients with chronic low back pain. *Clin Rheumatol* 2007;26:1895-1901.
- Jalili A, Bahrabadi M, Zare S. Prevalence of vitamin D deficiency in Nonspecific Musculoskeletal Pain. *Shafa Orthopedic Journal* 2015;2(4):e4052.
- Schreuder F, Bernsen R, van der Wouden JC. Vitamin D supplementation for non-specific musculoskeletal pain in non-western immigrants: a randomized controlled trial. *Ann Fam Med* 2012;10:547-55.
- Yetley EA. Assessing the vitamin D status of the US Population. *The Am J of Clin Nutr* 2008;88(2):558S-564S.
- Mitsikostas DD, Tsaklakidou D, Athanasiadis N, Thomas A. The prevalence of headache in Greece: correlations to latitude and climatological factors. *Headache* 1996;36(3):168-73.
- Zeng QY, Chen R, Xiao Y et al. Low prevalence of knee and back pain in southeast China; the Shantou COPCORD study. *Journal of Rheumatology* 2004;31(12):2439-43.
- Zhang Y, Leung DY, Richers BN, Liu Y, Remigio LK, Riches DW et al. Vitamin D inhibits monocyte/macrophage proinflammatory cytokine production by targeting MAPK phosphatase. *J Immunol* 2012;188(5):2127-35.
- Lacativa PGS, Farias ML. Osteoporosis and inflammation. *Arq Bras Endocrinol Metab* 2010;54(2):123-32.
- Bischoff-Ferrari HA, Dawson-Hughes B, Willett WC, Stachelin HB, Bazemore MG, Zee RY et al. Effect of vitamin D on falls: a metaanalysis. *JAMA* 2004;291:1999-2006.
- Kim TH, Lee BH, Lee HM, Lee SH, Park JO, Kim HS et al. Prevalence of Vitamin D deficiency in patients with lumbar spinal stenosis and its relationship with pain. *Pain Physician* 2013;16(2):165-76.

ORIGINAL PAPER

Clinical Spectrum of Poisoning in a Tertiary Care Hospital in Assam: A Retrospective Analysis

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ABSTRACT

Purpose: To collect hospital based data on the ever-increasing menace of household substance poisoning; so as to gauge the magnitude of the problem for formulating therapeutic and preventative strategies of the same. **Method:** Retrospective single center observational study for a period of one year. **Results:** Overall incidence was 3.2%; highest between 20 to 40 years. More incidences in the female sex were found in the rural population. Phenol and agricultural chemicals were mostly used. Familial disharmony and failure in examinations were the most common precipitating factors. Mortality rate was 1.2%. **Conclusion:** Knowledge for proper handling and first aid measures following exposure should be dissipated amongst the masses.

Keywords: Household Poisoning; Phenol; Familial Disharmony; Suicidal Ideation, Poisoning, phenol poisoning, agricultural poisoning

INTRODUCTION

Poison is a substance capable of producing damage or dysfunction in the body by its chemical activity. Since ages, the difficulties of poisoning both accidental and homicidal have been present. It was mostly accidental in the earlier times. Poisoning is a medical emergency and a patient is always invariably rushed to the hospital at the earliest for medical management. Uncontrolled use of poisons in the developing country has led to many deaths and devastating consequences in terms of case fatality.^{1, 2, 3}

Poison can be defined as, “a substance (solid, liquid or gas), which if introduced in a living body or brought in contact with any part thereof will produce ill health or death by its constitutional or local effects or both”. Due to rapid development in the field of science and technology and vast growth in the industrial and agricultural sector, poisoning is spreading like a wild fire.^{4, 5} Poisoning both accidental and suicidal is a significant

contributor of mortality and morbidity worldwide. The pattern of poisoning again depends on many factors like socioeconomic condition, cultural and religious influences and availability in India. The exact data is yet not available but it seems that around 5-6 persons die due to poisoning every year.^{4, 5, 6, 7} Organophosphorus poisoning forms the largest bulk in India.

Hazardous occupational practices and unsafe storage expose millions of people to the toxic effects of pesticides. The act of self-harm has been done to express anger, rebellion or revenge in some cultures. However deliberate self poisoning account for majority of fatal episodes and put tremendous stress on hospital services particularly in Asia.^{8, 9} Many studies have shown that deliberate poisoning has a far higher mortality than accidental poisoning. Determinants for a fatal event include poison's toxicity, time taken in receiving clinical attention and the efficacy of the treatment.¹⁰

Poisoning is an important public health problem in the developing countries of the world. Poisoning with household substances seems to be on the rise with a large number of patients presenting to the emergency department with the same. To gather further knowledge on this seemingly increasing public health menace, a retrospective data analysis was planned to know the magnitude of the problem as well as its pattern and to identify the kind of material used for the act, as also to know the clinical spectrum and complications arising out of it.

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MATERIALANDMETHODS

It was a single center, retrospective observational study done at the Medicine Department of Gauhati Medical College and Hospital for six months, from 1st January to 30th June of 2014.

Inclusion criteria: All adult patients aged above 12 years admitted to the medicine department with poisoning.

Exclusion criteria: Age <12years, overdose due to alcohol, food poisoning, snake envenomation and insect bite poisoning were excluded from the study analysis.

RESULTSANDOBSERVATIONS

A total of 10,492 patients were admitted for the duration at GMCH out of which 343 patients were with various poisoning, the incidence being 3.2%. Highest incidence was in the age group of 21-39 yrs (56%) followed by 12-20 years (31%). Among them 2% patients belonged to the age group of >60 years (**Table 1**).

Table 1 Distribution of poisoning cases in relation to age groups

Age Group	Number of Patients	Percentage
<20	106	31%
21-39	194	56%
40-59	35	11%
≥60	8	2%

Our analysis has revealed 58% incidences in the female sex (**Figure 1**). Similarly, incidence was more from the rural populace (85.27%) is shown in **Figure 2**.

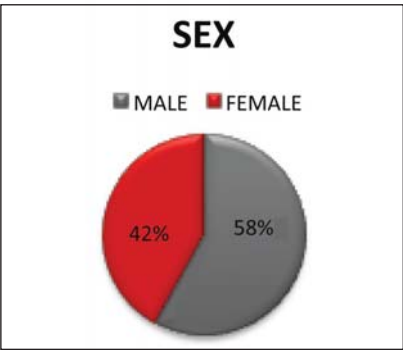


Figure 1 Distribution of poisoning cases in relation to sex

Almost equal incidence was seen in married and unmarried people (50.2 and 49.8%) as shown in **Figure 3**.

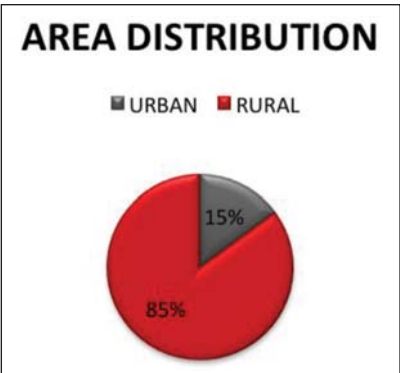


Figure 2 Distribution of poisoning cases in relation to area



Figure 3 Distribution of poisoning cases in relation to marital status

With regard to educational background, highest incidence was found in people with education till primary school level (65%) followed by secondary school level (22%) and illiterate (13%) are shown in **Table 2**.

Table 2 Distribution of poisoning cases in relation to education background

Education	Number of Patients	Percentage
Illiterate	45	13%
Primary Education	223	65%
Secondary Education	75	22%

Phenol (46%) and agricultural chemicals (44%) were the highest used substances (**Table 3**). Suicidal intention was the driving force for 80% of cases, with accidental ingestion being alleged by the rest 11% of them (**Table 4**).

Table 3 Types of poisoning cases

Types	Number of Patients	Percentage
Agricultural	151	44%
Phenol	158	46%
Medication	20	6%
Others	14	4%

Table 4 Nature of poisoning cases

Causes	Number of Patients	Percentage
Suicidal	275	80%
Accidental	37	11%
Homicidal	31	9%

Amongst probable etiology, familial disharmony topped the chart (69%) followed by examination failure (10%), emotional turmoil due to love affair (9%) and financial crisis (7%) and psychiatric illness at last (5%) as shown in **Table 5**.

Table 5 Etiology of the cases

	Number Of Patients	Percentage
Familial Disharmony	236	69%
Love Affair	31	9%
Failure In Exams	34	10%
Financial Crisis	25	7%
Psychiatric Illness	17	5%

Among the admitted cases 98.8% cases recovered (98.8%); only 1.2% of them were died and referred for medico legal investigation in accordance of law.

DISCUSSION

Cases of suicidal poisoning by various chemical compounds are being reported very frequently from all parts of India and other countries. The WHO estimated that there were 8,73,000 suicides worldwide in the year 2002, which makes suicide a major cause of premature mortality globally. The WHO reports that pesticides are now the most common method of suicide worldwide.¹¹ Acute poisoning is a clinical emergency and early diagnosis, treatment and prevention are crucial in reducing the burden of poisoning related injury in any country.¹¹ A thorough review of the risk factors helps to decrease the incidence and mortality.

We found females (58%) to be more affected as compared to males (42%). Khokan MK³ while Kumar SV found similar observations; Panda BB, Karki RK and Prajapati BK found males were more involved than females in their study.^{11, 12, 14, 15}

The incidence of poisoning is maximum in the 3rd and 4th decade (56%) followed by 2nd decade (31%) in our study. This is similar with studies from Kumar SV, Panda BB, Karki RK and Prajapati BK.^{11, 12, 14, 15} Khokan MK found maximum incidences in 2nd decades in their study.¹³

We found highest incidences in married people (50.2%). Kumar SV, Panda BB and Khokan MK also observed similar findings.^{11, 12, 13}

Incidence of poisoning was more common in rural areas (85.27%) than urban areas (14.73%). This was similar to Karki RK and Prajapati BK.^{14, 15} However Khokan MK found higher incidence in urban areas.³

We found highest incidence in primary school goers (65%) which was similar to Khokan MK.¹³

Familial disharmony was the most common precipitating circumstance in our study (69%) followed by failure in exams (34%) and love affair (31%). Khokan MK also reported highest incidence with familial disharmony (70%).¹³

Suicide (80%) was the most common cause followed by accidental ingestion (11%) and homicide (9%). Khokan MK and Karki RK also observed similar findings.^{13, 14}

Phenol (46%) was the most common type of poisoning followed by agricultural poison (44%) in our study. Prajapati BK and Karki RK saw similar observations.^{14, 15}

Case fatality was low in our study (1.2%). Kumar SV and Panda BB reported case fatality ratio of 8.3% and 3.84% in their study.

CONCLUSION

Poisoning by household chemicals seems to be a rather increasing problem in this part of the country. With introduction of modern amenities of life, more and more new chemical substances are going to be used in the household. This has the potential of

human exposure accidentally or by intentional purpose. Proper precaution to keep the household chemical substances is required. At the same time knowledge for proper handling and first aid measure following exposure need to be given to the public. To formulate strategies for prevention we need to compile data from all regions of the country to find the risk factors and then address those. We therefore pledge all concerned to come up with their regional data so that national strategy to tackle the menace can be prepared soon. More research is needed to better understand this fast growing menace of poisoning for better management and possible intervention programmes are needed to tackle this problem urgently.

Conflict of Interest: No conflict of interest associated with this work.

Ethical Clearance: Taken

Contribution of Authors: We declare that the authors named in this article did this work and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. We declare that this work does not infringe any copyright or violate any other right of any third parties; the article has not been published (whole or in part) elsewhere, and is not being considered for publication elsewhere in any form, except as provided herein. We declare that all the authors have contributed sufficiently in the article and take public responsibility for it. All authors read and approved the final manuscript.

REFERENCES

- Gorea RK, Dalal JS, Gargi J, Rai H. Pattern of Poisoning in Punjab. *J Punjab Acad Forensic Med Toxicol* 2001;1:6-8.
- Pothireddy S, Mohanty MK. Study of poisoning cases in a tertiary care Hospital, JSIMLA 2011;3:14-18.
- Dash SK, Raju AS, Mohanty MK, Patnaika KK, Siddhartha P, Mohanty S. Socioeconomic profiles of poisoning cases. *JIAFM* 2005;27:133-138.
- Reddy KSN. The essentials of forensic medicine and toxicology, 27th ed. Hyderabad: K SUGUNA DEVI; 2008. p. 457-466.
- Nandy Apurba. Handbook of Forensic Medicine and Toxicology. 1st ed. Kolkata: New Central Book Agency (p) Ltd; 2013. p. 464-482.
- Pillay VV. Textbook of Forensic Medicine and Toxicology. 16th ed. Hyderabad: Paras Medical Publishers; 2011. p. 515-529.
- Subramanyam BV. Modi's Medical Jurisprudence and Toxicology. 22nd ed. New Delhi: (Name of publisher); 1999. p. 10-12.
- Vanderhoek W, Konrasen F, Athukorala K, Wanigadewa T. Pesticide Poisoning – a major health problem in Sri Lanka. *Soc Sci Med* 1998;46:495- 504.
- Eddleston M, Rezvi MH, Hawton K. Deliberate self harm in Sri Lanka: an overlooked tragedy in the developing world. *BMJ* 1998;317:133- 135.
- De Silva P. The logic of attempted suicide and its linkage with human emotion- suicide in Sri Lanka Kandy institute of fundamental studies 1989;1:25- 40.
- Kumar SV, Venkateswarlu B, Sasikala M, Kumar GV. A study on poisoning cases in a tertiary care hospital. *Journal of Natural Science, Biology and Medicine* 2010 Jul 1;1(1):35.
- Panda BB, Hansda MK, Mishra K, Samantsinghar P. Study of Poisoning Cases in an Indian Tertiary Care Teaching Hospital. *Journal of Indian Academy of Forensic Medicine* 2015;37(2):165-8.
- Khokan MK, Islam AH, Basher A, Alam MR, Faiz MA. Patterns of Self-Poisoning by Household Substances. *International Journal of Medical Toxicology and Forensic Medicine* 2011;1(2):59-64.
- Karki RK, Risal A. Study of Poisoning Cases in a Tertiary Care Hospital. *Kathmandu University Medical Journal* 2014 Sep 3;10(4):70-3.
- Prajapati K, Merchant SP, Patel PR. Trends of Suicidal Poisoning in Ahmadabad-A Retrospective Study. *Indian Journal of Forensic Medicine & Toxicology* 2013 Jan 1;7(1):82.

ORIGINAL PAPER

CT and MRI Evaluation of Sino Nasal Mass

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ABSTRACT

CT and MRI play complementary roles in the assessment and staging of these malignancies by determining the presence or absence of extension of disease into the skull base and its foramina, the orbit and the intracranial compartment.

This study was conducted for the evaluation of sinonasal masses with the aims to study the incidence of sino-nasal masses and their clinical features, to diagnose accurately the site and extension of lesion into the surrounding structures and to assess bony involvement and to characterize the mass on CT & MR and to correlate with histopathological diagnosis. Statistical analysis was done over 50 patients with various age groups with CT and MRI Evaluation of Sino Nasal Mass. Computed Tomography and Magnetic resonance Imaging can define the character of the Sinonasal mass, thus differentiating benign from malignant.

Keywords: CT, MR, Sino Nasal Mass

INTRODUCTION

Even though the existence of the Paranasal sinuses may be unexplained, their susceptibility to disease is a common source of suffering for patients and a focus of attention for clinicians.

Malignant neoplasm of the sinonasal tract is rare, since they account for only 1% of all malignancies,¹ with an annual incidence of 0.5-1 new cases/1000000 inhabitants. Although infrequent, sinonasal neoplasm includes a variety of histotypes, a distinctive feature that reflects the peculiar density in this area of different anatomic structures. In India, the upper aero digestive tract cancer that includes the sinonasal tract, etc., constitutes nearly 30-35 of all cancers in the body.²

Dramatic improvements in radiologic imaging in recent years have, as a corollary, dramatically improved our understanding of sinonasal tumors. Modern imaging modalities depict sinonasal tumors and their metastases in detail, radiologic examination is commonly employed as a precise “map” for implementation of

therapy, and imaging studies are essential in the follow up evaluation for tumor residual or recurrence.

CT and MRI play complementary roles in the assessment and staging of these malignancies by determining the presence or absence of extension of disease into the skull base and its foramina, the orbit and the intracranial compartment. Staging of these lesions has been closely monitored by dependence on computerized tomography (CT) scan and now in small proportion with MRI.

The radiologist must describe in detail the sinus and the precise area within each sinus that are apparently affected by tumor. The paranasal sinuses are best evaluated by computerized tomography in the axial and coronal planes. Somin 1982 commented that the value of CT lies not only in its ability to evaluate clinically known disease but also to image clinically silent disease. The latter can occur in two ways. First, the CT scanner can image tumors in areas that are inaccessible or very difficult to examine clinically. In sinonasal cavities primarily only the anterior lower nasal vault is exposed to direct physical observation. Secondly, the tumor may be sub mucosal and not clinically appreciated, but can be visualized on CT.

As CT scan technology evolves, the role of the CT scanning evaluating sinonasal tumor is increasing. High resolution and thin sectioning CT scan depicts bone erosion best. Critical areas to be assessed include the bony orbital walls, cribriform plate, fovea ethmoidalis, and posterior wall of the maxillary sinus with its attached pterygoid plates, pterygopalatine fossa and sphenoid sinus.³

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CT excels in the evaluation of disorders that primarily affect air spaces or cortical bone. However, soft-tissue characterization is much more limited than with MR imaging. In contrast, MR imaging provides poor information about the air spaces and bone, but excellent soft-tissue contrast resolution.

One of the major imaging problems of precise tumor mapping is distinguishing tumor from adjacent inflammatory disease. Basing this distinction on routine CT attenuation values is fraught with inaccuracies. Contrast-enhanced CT can improve the results; however, MR imaging is superior in making this distinction. Inflammatory secretions and tissues have high water content and thus have high T2-weighted signal intensities. By comparison, virtually all sinonasal tumors are highly cellular, with relatively little intracellular and intercellular water, and the majority of these tumors have intermediate signal intensity on T2-weighted images.^{4, 5} Thus, the mainstay of the MR imaging distinction between tumor and adjacent inflammatory tissues is the T2-weighted MR sequence. It is rare for sinonasal tumors to have inherently high T2-weighted signal intensities, which may be seen with benign or low-grade minor salivary gland tumors, schwannomas, rare hemangiomas, and polypoid tumors such as inverted papillomas. Therefore these tumors may not be as amenable to accurate T2-weighted tumor mapping.

METHODS

The study was carried out on 50 patients who underwent Computerized Tomography imaging of the Nose and Paranasal sinuses in the department of Radiology Guwahati Medical College and Hospital from May 2006 to September 2007. CT evaluation was carried out using a SIEMENS SOMATOM AR STAR spiral CT scanner.

The two major indications for CT scanning was either evaluation of patients affected with chronic and recurrent rhino sinusitis or for the evaluation of Sinonasal mass.

Patient preparation: At least 3 weeks of adequate medical treatment (Oral antibiotics, nasal steroids and antihistamines) was ensured before CT examination in patients evaluated for chronic sinusitis. Additionally the patients were asked to clear their nose just before undergoing the examination.

CT protocol in cases of sinusitis and nasal polyposis: In the setting of sinusitis and nasal polyposis, the rationale of imaging was to obtain detailed information on patency / occlusion of mucous drainage pathways, on bone changes (particularly in critical areas such as the skull base and orbit), intrasinus content (air, fluid, solid, calcifications) and on anatomic variants. Scanner computation algorithms were selected to favor the demonstration of soft tissue. Window widths were usually at 2,000, and the window was centered to -200.

Direct coronal scanning: The coronal plane was the preferred plane for direct scanning. Each patient was positioned prone with the head hyperextended on the scanner bed. Images were acquired as perpendicular to the hard palate as permitted by gantry tilting and patient cooperation. The examination area extends from the anterior frontal sinus wall to the posterior border of the sphenoid sinus.

Axial scanning: Axial scans were acquired as a complement to the coronal study. It was basically focused on anatomical areas inadequately demonstrated in the coronal orientation. Additionally this scan plane is valuable for the detection of Onodi cells. The patient lies in supine position and direct scans are obtained parallel to the hard palate from the upper border of frontal sinuses to the alveolar process of maxillary bones.

CT protocol in neoplastic lesions: CT protocol consists of native and post contrast scanning in both axial and coronal planes. Contrast was administered as a single bolus and the examination was first done in the axial plane followed by the coronal scans. Spiral techniques were used as they are faster and require lower doses of contrast agent.

A high contrast resolution is mandatory, therefore a higher radiation dose is required and both soft tissue and bone algorithms are adopted for images reconstruction. The true value of CT lies in its ability to detect bony changes.

RESULT

Age incidence: The age-wise distribution of the patients was shown in **Table 1**. Maximum numbers of case were in the age group of 11–20 years (36%). Out of the 50 cases 41 patients were male and 9 patients were female.

Table 1 Distribution of the cases according to their age

Age in year	No of Cases	Percentage
1-10	2	4
11-20	18	36
21-30	3	6
31-40	3	6
41-50	11	22
51-60	7	14
>60	6	12

Age and sex incidence of the lesions: Maximum numbers of benign cases were seen in the younger age group, while malignant lesions were prevalent in the older age group. Both benign (24 cases) and malignant lesions (17 cases) were more prevalent in male populations (**Table 2**).

Table 2 Relative incidences of Sinonasal masses with age and sex distribution

Sinonasal Mass	No. of Cases		Total
	Male	Female	
Benign	24	5	29
Malignant	17	4	21
Total	41	9	50

Clinical presentations: The nasal obstruction, nasal discharge, intranasal mass, headache and epistaxis are the most common presenting symptoms of sinonasal lesions (**Figure 1**).

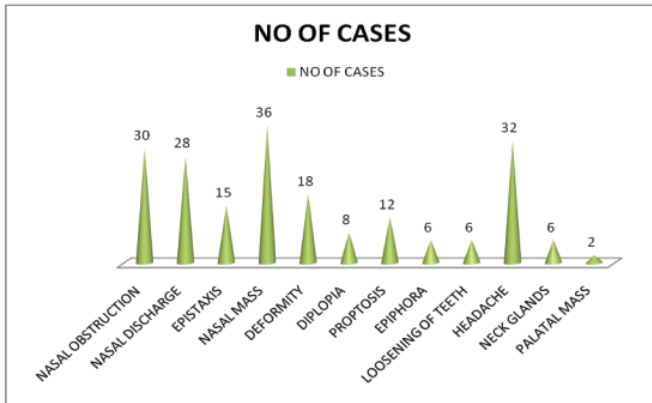


Figure 1 Clinical presentation of the cases

Anatomical location and extension: In the present study, it appears that benign sinonasal masses most commonly occupied the nasal cavity and the nasopharynx. While the malignant lesions occupied the maxillary sinus most commonly this was followed by nasal cavity and ethmoid sinus. Most of the malignant lesions showed extension to the orbital cavity (**Figure 2**).

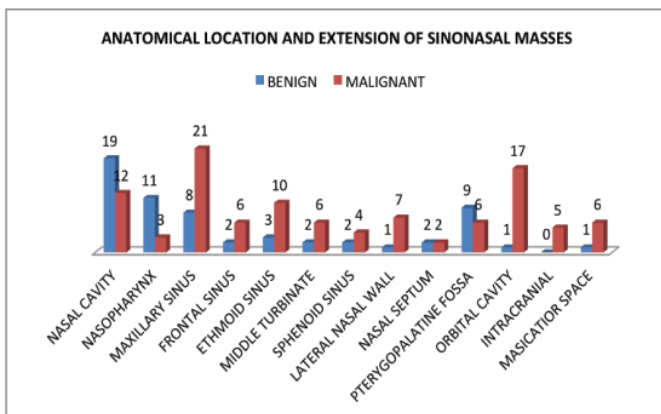


Figure 2 Anatomical location and extension of sinonasal masses

Histological Diagnosis of Benign and Malignant Sinonasal Masses: Out of the 29 benign lesions, most of the lesions were papilloma (38%) and angiofibroma (31%) whereas of the 21 malignant lesions, most of the lesions were squamous cell carcinoma (38%) followed by malignant lymphoma (24%).

CT characteristics of the lesions: Out of 30 cases evaluated with CT, 18 cases found benign and 12 were having malignant lesions.

Density of benign and malignant sinonasal masses in CT: Out of 18 benign masses 13 cases showed soft-tissue density, 2-bone density, 1 purely cystic and 2 mixed density. Out of 12 malignant masses 5 cases showed heterogeneous soft-tissue density, 5 mixed density and 2-showed homogeneous soft-tissue density. Mixed density encompasses the lesions showing an admixture of soft-tissue density, cystic density with or without calcifications.

Bone changes in Sinonasal mass-lesions in CT: The bony changes observed were remodeling, sclerosis; destruction and

expansion were shown in **Table 3**.

Table 3 Bone changes in Sinonasal mass-lesions in CT

Bone Changes	Benign	Malignant
Remodeling	11	0
Sclerosis	1	0
Destruction	3	9
Expansion	3	3

MRI characteristics of the lesions: A total of 20 cases were evaluated with computerized tomography, out of which 11 cases turned out to be benign lesions and 9 were malignant lesions.

Signal characteristics of the malignant Sinonasal masses: Out of the 9 malignant masses, 8 lesions showed intermediate signal intensities on T1 weighted images. On T2-weighted images, the lesions showed predominantly intermediate signal intensity followed by hypo intense signal intensity.

Bony involvement in MR: Benign lesions in MR revealed remodeling predominantly (8 cases), whereas, malignant lesions (9 cases) showed cortical invasion as suggested by loss of hypo intense cortical signal intensity on T1WI and altered marrow signal intensity which is best demonstrated on T2 fat suppressed sequences.

Enhancement pattern of benign Sinonasal mass lesions: Out of 29 benign masses 12 cases showed significant enhancement, 7 moderate enhancement, 7 minimal enhancements and 3 showed no enhancement.

Enhancement pattern of malignant Sinonasal mass lesions: Majority (67%) of the malignant Sinonasal masses revealed heterogeneous enhancement (**Figure 3**).

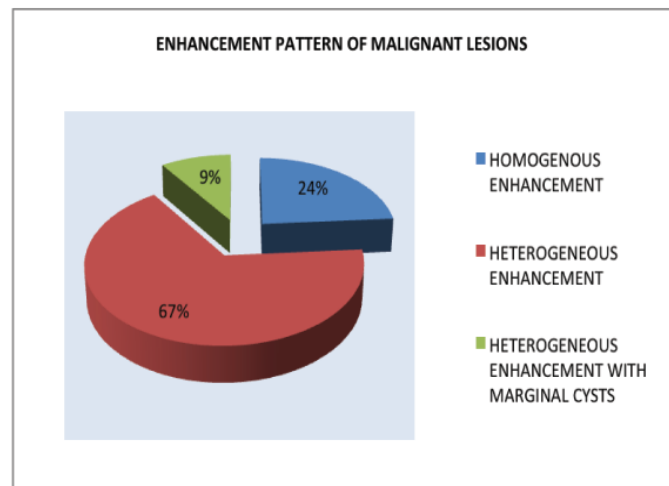


Figure 3 Enhancement pattern of the malignant lesions

DISCUSSION

The benign lesions occurred most frequently in the second decade of life numbering 18 well tallied with the study by Barnes L⁶ and for malignant lesions findings are tallied with Sakai as most of the patients belonged to 5th, 6th and 7th decades of life. Bimodal age distribution was seen in case of Sinonasal lymphoma

correlates with the observation of **Batsakis J.**⁷ Barnes L⁶ also observed the diseases of the nose and Paranasal sinuses with a male predominance.

Nasal mass, nasal obstruction and nasal discharge which was seen in 72% of patients was the commonest presenting symptoms also observed by Spiro R, Koss L, Hajdu S in their studies.⁸

In this study 11 benign lesions to have originated from lateral nasal wall and 9 from pterygopalatine fossa. This correlates well with the study by L Loyd G, Lund V and Phelps PD.⁴

In the present study, bone density of the lesion was similar to the findings of the study conducted by Som P, Shapiro M, Biller H, Sasaki C, Lawson W.⁵

Yousem⁹ in a series of 10 cases found that inverted papillomas had intermediate signal intensity on T1-weighted sequences and ISO or slightly hypointense to fat on T2-weighted sequences similar to the present study.

Juvenile angiofibromas on MR imaging in the present study reveal intermediate signal intensity on T1-weighted and T2-weighted sequences, with multiple-flow voids similar to the study of Herman.¹⁰

In this study, the only case of schwannoma showed hyperintense signal on T2-weighted imaging, which tallied with the studies of L Loyd G, et al.⁴ Papillomas in this study reveal patchy areas of moderate enhancement which correlates well with study by Yousem et al.⁹

Soft tissue mass extending beyond the areas of origin were seen all the cases of malignant Sinonasal tumors. Chow J³ has commented about the propensity of maxillary sinus and ethmoid sinus malignancies to involve adjacent sinuses nasal cavities, orbits, pterygopalatine fossa, infratemporal fossa and the anterior cranial fossa. In the present series that included maxillary, ethmoid and nasal malignancies, orbital involvement was noted in bulk of the patients (80%). Intracranial extension could be well demonstrated in 24% of cases.

Cortical destruction is detected at CT as a break of the mineralized bone through its whole thickness. Aggressive benign neoplasms such as juvenile angiofibroma and malignant tumors have shown cortical destruction in our study as has been mentioned by Som.⁵ Cortical destruction in MR is best demonstrated on T1-weighted sequences as loss of normal hypointense cortical signal intensity.

Permeative destruction with extensive replacement of the medullary bone even in the absence of evident cortical erosion was seen in 5 cases of sinonasal lymphoma. Permeative destruction with or without sclerosis is a peculiar pattern observed mostly in lymphomas and in adenoid cystic carcinoma also observed by SYasumoto.¹¹

Bony abnormality most commonly seen in case of malignant sinonasal tumors was destruction. Evidence of bone destruction has been mentioned as one of the characteristic findings of malignant sinonasal tumor in various studies.^{12,13} Som P⁵ in 1982 commented that if bone remodeling was present squamous carcinoma itself should not be present and a plasmacytoma, lymphoma, one of the low grade sarcomas or enthesioneuroblastoma should be considered.

Recent evidence in the surgical literature supports a conservative approach even in the presence of bone erosion on condition that periorbital is not invaded.⁴

Thus, imaging of the periorbital is crucial. Prediction of orbital invasion has been based on the detection of the positive findings

graded through progressive steps: tumor contacting the periorbital (Sensitivity of CT and MR 90%); fat obliteration (Positive predictive value CT 86% and MR 86%); extra ocular muscle involvement (Positive predictive value of MR 100%). CT proves to be more accurate for assessing the periorbital invasion than MR.

Like in the invasion of orbital walls, CT better demonstrates bone destruction of skull base, the goals of imaging focus on establishing the depth of skull base invasion. The main goals of imaging are to provide a precise map deep tumor extension in all those areas blinded at fiber optic examination, especially anterior cranial fossa, orbit and pterygopalatine fossae.

The Paranasal sinus malignancies are treated by radiotherapy and surgeries. CT and MR altered the entire pattern of management of the patients with sinonasal malignancy involved in the study. CT and MR also helped differentiate benign and malignant disease in our study.

CONCLUSION

Anatomical location of the sinonasal masses and their extension can be defined accurately by using Computed Tomography and Magnetic Resonance Imaging. Computed Tomography and Magnetic resonance Imaging can define the character of the Sinonasal mass, thus differentiating benign from malignant. Computed Tomography and Magnetic resonance permits a more detailed evaluation of bony structure and soft-tissue contents including those of sinuses and nose. Computed Tomography allows easy appreciation of bony abnormalities and detection of calcification. Computed Tomography and Magnetic resonance are helpful in planning treatment procedure and follow up studies.

Conflict of interest: None declared.

Ethical clearance: Taken.

Contribution of Authors: We declare that the authors named in this article did this work and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

REFERENCES

1. Tufano. Sinuses, Malignant Tumors of the Nose and Paranasal Sinuses. American J of Rhinology 1999;13(2):117-123.
2. Desai. Oncology. J of Cancer Research and Clinical Oncology 1994;120(4):193-199.
3. Mafee M, Chow J, Meyers R. Functional endoscopic sinus surgery. 1993.
4. L Loyd G, Lund V, Phelps PD. Magnetic resonance imaging in the evaluation of nose and Paranasal sinus disease. Br J Radiology 1987;60:957-968.
5. Som P, Shapiro M, Biller H, Sasaki C, Lawson W. Sinonasal tumors and inflammatory tissues: differentiation with MR imaging. Radiology 1988;167:803-808.
6. Barnes L, Verbin R, Gnepp D. Diseases of the nose, Paranasal sinuses and nasopharynx. In: Barnes L, ed. Surgical Pathology of the Head and Neck. Vol. 1. New York: Marcel Dekker; 1985. p. 403-451.
7. Batsakis J. Tumor of the Head and Neck: Clinical and Pathological Considerations. 2nd ed. Baltimore: Williams and Wilkins; 1979. p. 177-187.
8. Spiro R, Koss L, Hajdu S. Tumors of minor salivary origin: a clinicopathologic study of 492 cases. Cancer 1973;31:117-129.
9. D M Yousem, C Li, K T Montone, L MontgYousem. Primary malignant melanoma of the Sinonasal cavity: MR imaging evaluation and 1101-1110. Radiographics September 1996;6:5.
10. Herman. Long-term follow-up of juvenile nasopharyngeal angiofibromas: Analysis of recurrences and Te Laryngoscope 1999;109(1):140-147.
11. Yasumoto M, Taura S, Shibuya H. Primary malignant lymphoma of the maxillary sinus: CT and MRI. Neuroradiology 2000;42:285-289.
12. Weber AL, Bui C, Kaneda T. Malignant tumors of the mandible and maxilla. Neuroimaging Clin N Am 2003;13:509-524.
13. Davis WE, Templer J and Parsons DS (1996) and Anatomy of the paranasal sinuses. Otolaryngol. Clin North Am 29(1):57-91.

ORIGINAL PAPER

Scope for Improvement in the Guidelines Provided to Authors in Biomedical Journals from Assam: A Comparative Analysis with Core Clinical Journals

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ABSTRACT

Introduction: “Instruction to authors” given in journals may play a vital role in creating awareness about various aspects of scholarly communication, more so for naive authors. **Aims:** To find out whether biomedical journals from Assam offer directions to write and report scientific manuscript in a standardized and transparent manner by referring to guidelines endorsed by International Committee of Medical Journal Editors (ICMJE) or similar sources in their instructions given to authors; if not, identify the aspects on which they lack. **Methods:** Biomedical journals published from Assam and Core Clinical Journals were located from the National Science Library, India and National Library of Medicine, USA respectively. The instructions to authors or similar guideline for the included journals were surveyed and data regarding ten pre-specified domains were collected. The domains analysed were whether they provide any instruction to authors, guidelines for manuscript preparation for articles of different formats, word limits; define authorship criteria and misconduct; endorse ethical clearance, declaration of conflict of interest, trial registration, guidelines for research reporting; prohibit duplicate submission. **Results:** Ten biomedical journals from Assam were located and compared with a randomized sample of 10 of the 119 Core Clinical Journals. Compared with the Core Clinical Journals, biomedical journals from Assam were lacking in all the domains analyzed. **Conclusion:** The biomedical journals from Assam have not referred to most of the studied domains in their instructions to authors.

Keywords: Authorship criteria, conflict of interest, CONSORT, ethical clearance, International Committee of Medical Journal Editors, instructions to authors, trial registration

INTRODUCTION

The International Committee of Medical Journal Editors (ICMJE) provides guideline covering all aspects to produce accurate, clear, reproducible and unbiased medical journal articles.¹ Among many domains that are presented in the guideline by ICMJE, strict authorship criteria, declaration of conflict of interest, clinical trial registration and transparent and unbiased reporting of scientific work are necessary to maintain credibility of scientific publication.^{1, 2} Guidelines (e.g. CONSORT, STROBE etc.) for reporting various types of study design has been suggested to improve quality and transparency of health research.^{1, 2, 3} It is suggested that journals should be more proactive to influence standards of scientific conduct and publication by publishing ethical guidelines for research in their instructions to authors.⁴ Editorial policies, available in the instructions provided to authors, on different aspects of manuscript preparation have not been studied systematically worldwide; let alone in journals published from Assam.

Thus, the objective of this study was to find whether the biomedical journals from Assam offer directions to authors to write and report scientific manuscript in a standardized and

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transparent manner in their instructions given to authors; if not, identify the aspects in which they lack. We hypothesised that the instructions to authors of these journals sufficiently provide guidance for preparation of a manuscript and are comparable with that of Core Clinical Journals.⁵

MATERIAL AND METHODS

This is a cross sectional comparative study of the texts included in the ‘Author’s instruction’ or similar documents of biomedical journals published from Assam and a randomised sample of Core Clinical Journals.⁵ Journals were eligible to be included if published from Assam or included in the list of Core Clinical Journals, could be accessed online, provides ‘Author’s instruction’ or similar documents either on their respective webpage or as a part of the journal issues available online and publishes exclusively in English. All those journals publishing articles in a single format (e.g. review articles, case reports etc.) or exclusively in translational research or with a broader scope including health sciences were excluded.

For journals published from Assam, the “List of Assigned ISSN” (1986- 2014) and the “List of recently Assigned ISSN” (January 2015 onwards) was downloaded from National Science Library (NSL), India via Google Chrome and the first two authors independently searched for ‘titles’ of the ‘serials’ suggesting a biomedical journal. ‘The titles and the site of publication were noted. National Library of Medicine (NLM) Catalogue, IndMed, Embase, DOAJ were also searched to retrieve any additional journal titles published from Assam. For a representative sample for comparison, a list of “Core Clinical journals” was obtained from NLM, USA.⁵ This group of journals are considered, although many may argue its validity in this millennium, to be of immediate interest to practicing physicians.⁷ The flow chart documenting the process of selection of the comparison group is available in **Figure 1**.

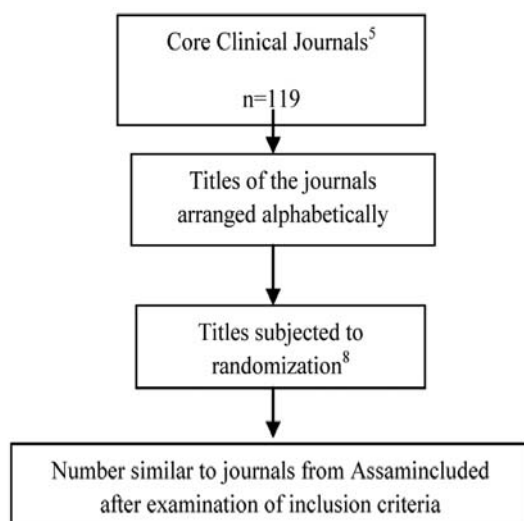


Figure 1 Selection process of the sampled Core Clinical Journals⁵

From all the included journals, the first two authors independently collected data whether the journal-

- I. Provides instruction to authors or similar guidelines
- II. Provides guidelines for preparation of manuscript of different formats

- III. Provides guidelines for word limits for all types of articles
- IV. Describes the criteria of authorship or refers to ICMJE authorship criteria
- V. Mentions about scientific misconduct or refers any other source for such information
- VI. Prohibits duplicate submission of manuscripts Further, we accessed if there is mention of
- VII. Declaration of conflict of interest
- VIII. Clearance by Ethical Committee or similar authoritative body for studies involving humans or animals
- IX. Trial registration
- X. Guidelines for research reporting (e.g. CONSORT)

For these information we had three rating options. The rating “information recommended” was applied to words such as “should”, “we recommend that...” or “we encourage.....”. The rating “information required” was applied to more stronger wording like “authors must...”, “we expect authors to...” or “we require authors to...”.² We also noted if there was no mention.

In case of any discrepancy between the first two authors, the third author was consulted and the decision of the majority was recorded. All data was retrieved during the period 27/8/2016 to 29/8/2016.

STATISTICAL ANALYSIS

Data are presented as percentage. For hypothesis testing, Fisher’s Exact Test was used. The level of statistical significance was set at $P < 0.05$. All statistics were performed with GraphPad Software, GraphPad Software, Inc, USA.

OBSERVATION AND RESULTS

Ten journals published from Assam met inclusion criteria (**Figure 2**).

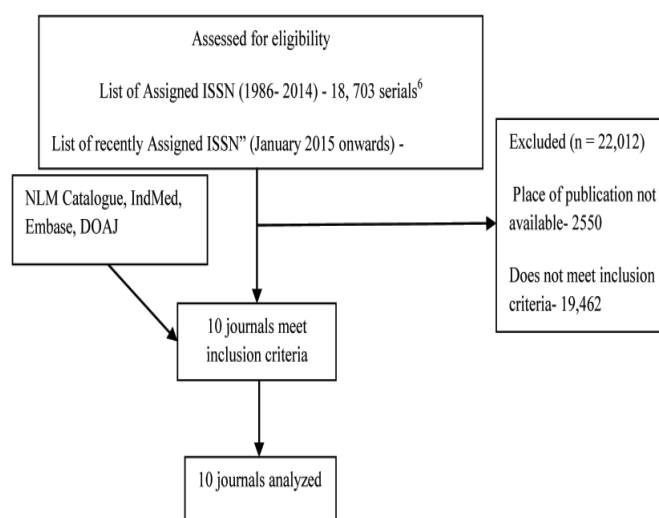


Figure 2 Process used to locate biomedical journals published from Assam

A random sample of 10 Core Clinical Journals was chosen.^{5, 8} The name of the journals included for this study is available in **Table 1**.

Table 1 Name of journals published from Assam and the sampled Core Clinical Journals⁵

Biomedical journals published from Assam	Core Clinical Journals ⁵
Assam Journal of Internal Medicine	Anesthesia and Analgesia
Eastern Journal of Psychiatry	Archives of Disease in Childhood
International Journal of Health Research and Medico Legal Practice	Archives of Physical Medicine and Rehabilitation
Journal of Association of Surgeons of Assam	Clinical Toxicology (Philadelphia, Pa.)
Open Journal of Psychiatry & Allied Sciences	JAMA Ophthalmology
The New Indian Journal of OBGYN	JAMA Paediatrics
SAS Journal of Medicine	Journal of Clinical Pathology
SAS Journal of Surgery	Journal of the Academy of Nutrition and Dietetics
Scholars Journal of Dental Sciences	The Journal of Clinical Investigation
Scholars Journal of Applied Medical Sciences	The Journal of Infectious Diseases

Data about the pre specified domains along with the results of hypothesis testing are mentioned in **Table 2**. Among the relevant categories, wherever the rating “required” is applicable, it is mentioned as percentage (number of journals endorsing it being the denominator) in bracket.

Table 2 Comparison of variables under study among bio medical journals published from Assam and sampled Core Clinical Journals⁵

Parameters	Biomedical journals from Assam (n= 10)	Core Clinical Journals ⁵ (n= 10)	P value (*represents statistical significance)
Instruction to authors or similar guidelines	90%	100%	1.000
Guidelines for preparation of manuscript of different formats	60%	100%	0.0867
Guidelines for word limits for different types of articles	70%	100%	0.2105
Criteria of authorship	30% (33% “required”)	90% (44% “required”)	0.0198*
Clearance by Ethical Committee or similar authoritative body for studies that involves human and animals	90% (11% “required”)	100% (90% “required”)	1.000
Misconduct	30%	70%	0.1789
Declaration of conflict of interest	50%	100%	0.0325*
Trial registration	0	90% (100% “required”)	0.0001*
Guidelines for research reporting	0	90% (66% “required”)	0.0001*
Prohibition of duplicate submission	60%	90%	0.0143*

DISCUSSION

We observed that biomedical journals from Assam were not at par with their comparison group for all the variables evaluated. Domains with significant statistical difference were- description of authorship criteria, declaration of conflict of interest, prohibition of duplicate submission, mention of guidelines for reporting research and registration of clinical trials. The last two domains were not endorsed by any of the biomedical journals from Assam.

No study could be retrieved that examined the guidelines given to authors for manuscript preparation. Only a small number of studies have evaluated some of these domains and mainly ethical issues have been the subject of research. Most of these studies were done on a cohort of specialty journals, for e.g. psychiatry, anaesthesia, dental, urology, paediatric, and traditional medicine.^{2,9, 10, 11, 12, 13, 14, 15}. Apart from specialty journals, several domains

under evaluation in our present study, has also been evaluated in journals published from various specific geographical locations, e.g. Korea, India, China, Caribbean and Latin American and Croatia.^{15, 16, 17, 18, 19} A comparison of these studies with results obtained from our study is available in **Table 3**.

Table 3Endorsement of parameters under evaluation in different studies

Authors (number of journals included)	Year of publication	Percentage of journals that endorse				
		Criteria of authorship	Clearance by Ethical Committee	Declaration of conflict of interest	Trial registration	CONSORT
Asai T et al (11) ⁹	1999	100	90.9	63.63	-	-
Meerpohl JJ et al (69) ¹⁵	2010	-	-	78	23	20
Navaneetha C (126) ¹⁰	2011	-	45.23	-	-	-
Meerpohl JJ et al (41) ¹⁴	2011	-	-	61	32	29
Kunath F et al (55) ¹²	2012	-	-	-	-	23.6
Li XQ et al (195) ¹⁷	2012	-	-	-	2.5	3.08
Knüppel H et al (123) ⁷	2013	-	-	-	34	23
Mathur VP et al (37) ¹¹	2013	91.1	73	91.1	-	-
Reveiz L et al (56) ¹⁸	2013	-	-	-	36	13
Bhaumik S et al (30) ¹⁶	2013	-	-	-	30	53.3
Choi J et al (36) ¹⁵	2014	-	-	-	-	2.8
Stojanovski J et al (38) ¹⁹	2015	28.9	21	31.5	7.8	-
Shamseer L et al (168) ²⁰	2016	-	-	-	63	63
Our study	Assam (10) Core Clinical Journal (10)	2016 30 90	90 100	50 100	0 90	0 90

In all these studies,endorsement of these domains was at best moderate and was not uniform, except for Core Clinical Journals.

Among many barriers, inadequate skills and understanding of the process of writing is a major factor behind ineffective scripting of scientific articles.²¹ ‘Writing’ of a manuscript has been found to be an important factor, though being amongst the least ones, in editorial decision making of one of the most prolific journal in the history of biomedical scholastic publication.²² Although various methodologies for scientific writing are available and evaluated, we strongly believe that training in those methodologies is lacking generally for authors from Assam.²³ Thus, instructions that are given to the authors prior to submission of manuscript have the potential to improve their quality.

Journals have the liberty to endorse their own set of editorial policy and there are no universally acceptable instructions, encompassing all the necessary points and satisfying specific requirements of each discipline.²⁴ But it must be noted that the journals are at unique position and they can definitely enforce provisions that will ensure transparent and standardized reporting of research.²⁴ Thus, the barriers preventing incorporation of these domains need to be systematically evaluated.

There are limitations to our study. We may have missed journals as only titles included in NSL,whose name suggest being of biomedical stream, was included in our study. To mitigate this bias, though we searched other databases, it may be possible that they are not abstracted/ indexed in those electronic databases. We also could not determine if these domains are evaluated after submission of manuscript during editorial evaluation or peer review, as we limited our research only to analysis of the texts available in the instruction to authors.

CONCLUSION

The biomedical journals from Assam have not referred to most of the studied domains in their instruction to authors and are noticeably lagging behind the Core Clinical Journals. Lack of guidelines in regards to textual style of manuscripts definitely puts the novice author in a precarious situation.

We firmly believe that if these domains are mentioned and implemented, it would not only help naive authors in their future publication processes but also improve the acceptability as well as popularity of these journals.

Conflict of interest: None declared.

Ethical clearance: Institutional Ethical Committee clearance was not sought for as it is an audit of texts available in public domain and there was no contact with humans or animals.

Source of funding: None

Authors Contribution: (i) **1st Author:** Conceived the research question; retrieved and analyzed literature; designed the methodology; collected, analyzed and interpreted data; wrote the manuscript. **2nd Author:** Retrieved and analyzed literature; collected, analyzed and interpreted data, wrote the manuscript. **3rd Author:** Retrieved literature and analyzed literature; analyzed and interpreted data; wrote the manuscript. We would like to declare that this manuscript does not infringe any copyright or violate any other right of any third parties. The authors would like to mention that views expressed in the submitted article are his or her own and not an official position of the institution. (2) Findings of this research were presented during 'competition paper session' of North East Zone Indian Society of Anaesthesiologists Conference 2016 held at Dibrugarh and won second prize. The article has not been published (whole or in part) elsewhere, and is not being considered for publication elsewhere in any form, except as provided herein; (3) All author(s) have contributed sufficiently in the Article to take public responsibility for this manuscript. (4) All author(s) have reviewed the final version of the above manuscript and approve it for publication.

REFERENCES

1. International Committee of Medical Journal Editors. Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. [Online]. c2016 [cited 2016 Aug 27];[17p]. Available from: URL:<http://www.icmje.org/icmje-recommendations.pdf>
2. Knüppel H, Metz C, Meerpohl JJ, Strech D. How psychiatry journals support the unbiased translation of clinical research. A cross-sectional study of editorial policies. *PLoS One* 2013;8(10):e75995.
3. The EQUATOR Network. About us. [Online]. 2016[cited 2016 Dec 17];[about 2 screens]. Available from: URL: <http://www.equator-network.org/about-this-site/>
4. Atlas MC. Emerging ethical issues in instructions to authors of high-impact biomedical journals. *J Med Libr Assoc* 2003;91(4):442-9.
5. Abridged Index Medicus (AIM or "Core Clinical") Journal Titles. [Online]. 2003 [cited 2016 Aug 27];[about 6 screens]. Available from: URL:<https://www.nlm.nih.gov/bsd/aim.html>
6. List of Assigned ISSN" (1986- 2014) and the "List of recently Assigned ISSN" (January 2015 onwards) [Online]. [cited 2016 Aug 27]; Available from: URL: <http://nsl.niscair.res.in/issn.jsp>
7. Ketchum AM. Core Clinical Journals for the Twenty-First. [Online]. 2016 [cited 2016 Dec 2];[about 2 screens]. Available from: URL: <http://www.mlanet.org/blog/core-clinical-journals-for-the-twenty-first-century>
8. Random Sequence Generator. [Online]. 1998-2016 [cited 2016 Aug 27]; [about 1 screen]. Available from: URL: <https://www.random.org/sequences/>
9. Asai T, Shingu K. Ethical considerations in anaesthesia journals. *Anaesthesia* 1999;54(2):192-7.
10. Navaneetha C. Editorial policy in reporting ethical processes: A survey of 'instructions for authors' in International Indexed Dental Journals. *Contemp Clin Dent* 2011;2(2):84-7.
11. Mathur VP, Dhillon JK, Kalra G, Sharma A, Mathur R. Survey of instructions to authors in Indian and British Dental Journals with respect to ethical guidelines. *J Indian Soc Pedod Prev Dent* 2013;31(2):107-12.
12. Kunath F, Grobe HR, Rücker G, Engehausen D, Antes G, Wullich B, Meerpohl JJ. Do journals publishing in the field of urology endorse reporting guidelines? A survey of author instructions. *Urol Int* 2012;88(1):54-9.
13. Meerpohl JJ, Wolff RF, Niemeyer CM, Antes G, von Elm E. Editorial policies of pediatric journals: survey of instructions for authors. *Arch Pediatr Adolesc Med* 2010;164(3):268-72.
14. Meerpohl JJ, Wolff RF, Antes G, von Elm E. Are pediatric Open Access journals promoting good publication practice? An analysis of author instructions. *BMC Pediatr* 2011;11:27.
15. Choi J, Jun JH, Kang BK, Kim KH, Lee MS. Endorsement for improving the quality of reports on randomized controlled trials of traditional medicine journals in Korea: a systematic review. *Trials* 2014;15:429.
16. Bhaumik S, Biswas T. Editorial policies of MEDLINE indexed Indian journals on clinical trial registration. *Indian Pediatr* 2013;50(3):339-40.
17. Li XQ, Tao KM, Zhou QH, Moher D, Chen HY, Wang FZ, Ling CQ. Endorsement of the CONSORT statement by high-impact medical journals in China: a survey of instructions for authors and published papers. *PLoS One* 2012;7(2):e30683.
18. Reveiz L, Villanueva E, Iko C, Simera I. Compliance with clinical trial registration and reporting guidelines by Latin American and Caribbean journals. *Cad Saude Publica* 2013;29:1095-100.
19. Stojanovski J. Do Croatian open access journals support ethical research? Content analysis of instructions to authors. *Biochem Med (Zagreb)* 2015;25(1):12-21.
20. Shamseer L, Hopewell S, Altman DG, Moher D, Schulz KF. Update on the endorsement of CONSORT by high impact factor journals: a survey of journal "Instructions to Authors" in 2014. *Trials* 2016;17(1):301.
21. Hoogenboom BJ, Manske RC. How to write a scientific article. *Int J Sports Phys Ther* 2012;7(5):512-7.
22. Dickersin K, Ssemenda E, Mansell C, Rennie D. What do the JAMA editors say when they discuss manuscripts that they are considering for publication? Developing a schema for classifying the content of editorial discussion. *BMC Med Res Methodol* 2007;7:44
23. Phadtare A, Bahmani A, Shah A, Pietrobon R. Scientific writing: a randomized controlled trial comparing standard and on-line instruction. *BMC Med Educ* 2009;9:27.
24. Gasparyan AY, Ayzvayan L, Gorin SV, Kitas GD. Upgrading instructions for authors of scholarly journals. *Croat Med J* 2014; 55(3): 271-80.

ORIGINAL PAPER

Prevalence of Glaucoma Amongst Diabetic Patients Attending a Tertiary Health Care in North Eastern India

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ABSTRACT

Introduction: Glaucoma and the angiopathy of Diabetes Mellitus (DM) constitute a significant amount of blinding diseases of human beings. DM has been suggested as risk factors for Primary Open Angle Glaucoma (POAG) and Neovascular Glaucoma (NVG). Thus, with the alarming rise in Diabetes prevalence globally; the establishment of DM as a major risk factor for POAG and NVG and the matter of blindness following glaucoma and its management are of grave concern. Methods: The present study was conducted on 1200 diabetic patients between 15 - 75 years of age attending the Endocrinology and Ophthalmology departments. Systemic, routine ophthalmic examination and laboratory investigations were done in all cases. Applanation tonometry, slit lamp biomicroscopy, gonioscopy and disc evaluation using Goldman 3 -mirror lens, +90 D lens and visual field examination (using Humphrey visual field analyzer utilizing SITA standard strategy program 30-2) was performed. Results and Discussions: Among 1200 patients, POAG was found in 7.0% (n=84), Ocular hypertension (OHT) in 3.33% (n=40) and NVG in 2.33% (n=28). The prevalence of POAG in this study was nearly 5-6 times higher than that as seen in the general population. All the patients with NVG had PDR. Pupillary margin neovascularization preceded anterior chamber angle neovascularization in all these patients. POAG was seen to be more prevalent amongst OHA treated diabetics (8.25%), neovascular glaucoma amongst insulin treated (3.18%) and ocular hypertension showed no relationship to treatment pattern. Conclusion: POAG was found to be more prevalent amongst patients suffering from diabetes mellitus as compared to the general population and NVG was found in a significant proportion of diabetics with proliferative diabetic retinopathy.

Keywords: Diabetes Mellitus, Primary Open Angle Glaucoma, Neovascular Glaucoma

INTRODUCTION

Glaucoma is a potentially blinding, multifactorial optic

neuropathy with an estimated prevalence of around 60.5 million people worldwide in 2010 and is expected to increase to 79.6 million by 2020.¹ With 6 million people blind and millions more suffering from visual disability, it accounts for 13.5% of global blindness, third only to cataracts and trachoma. It is estimated to affect 12 million Indians; accounting for 12.8% of the total blindness in the country and is considered to be the third most common cause of blindness in India as well. The prevalence of glaucoma in India ranges from 2.6% to 4.1%.² Glaucoma and the angiopathy of Diabetes mellitus constitute a significant amount of blinding diseases of human beings. Thus, the matter of blindness following glaucoma and its management is of grave concern.

The general incidence of Diabetes mellitus is high for it affects between 1.4% and 1.7% of the population of the western world. As per the global estimate of the prevalence of diabetes mellitus in the above 15 years Indian population was an alarming 7.8%.³

The prevalence of primary open angle glaucoma (P.O.A.G.) is several times higher in the diabetic population than in the general population.^{4,5} The prevalence of rubeosis iridis among patients with diabetes mellitus ranges from 0.25-20%. The reported incidence of neovascular glaucoma (NVG) in diabetic patients with rubeosis iridis is also high.⁶

Objectives: To find out (1) the prevalence of primary open angle glaucoma and neovascular glaucoma amongst diabetic patients attending this tertiary eye care hospital. (2) A relationship between diabetes mellitus and the above mentioned types of glaucoma.

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METHODS

This study was conducted at the RIO, GMCH, and Guwahati, Assam on 1214 patients of Diabetes Mellitus over a period of 4 years from 01.04.2012 to 31.03.2016. Eight patients were lost to follow up after the initial work-up. Six patients who only allowed fundoscopic examination but refused IOP measurements and visual field analysis were excluded from the study.

Hence, the 1200 patients between 15 – 75 years of age attending the Endocrinology and Ophthalmology departments (both OPD and Indoor) were finally chosen on fulfillment of the following criteria for Diabetes Mellitus as advocated by the National Diabetes Data Group and WHO (adopted from the American Diabetes Association, 2007)

- Symptoms of Diabetes Mellitus plus Random Blood Glucose concentration ≥ 11.1 m mol/L (200 mg/dl) OR
- Fasting plasma glucose ≥ 7.0 m mol/L (126 mg/dl) on at least two occasions OR
- Two hour plasma glucose ≥ 11.1 m mol/L (200 mg/dl) during an oral glucose tolerance test (i.e., after ingestion of 75 gm of anhydrous glucose dissolved in water).

Diagnostic Criteria Of Primary Open Angle Glaucoma Patients: The criteria adopted were based on the Beaver Dam Eye Study.

1. I.O.P. ≥ 22 mm Hg by Applanation tonometry.
2. Glaucomatous cupping and pallor of the optic disc. The cup to disc ratio ≥ 0.8 or a difference of ≥ 0.2 in the involved eye.
3. Visual field defect typical of glaucoma.
4. A gonioscopically open angle.

DIAGNOSTIC CRITERIA OF NEOVASCULAR GLAUCOMA PATIENTS:

1. Intraocular Pressure (I.O.P.) ≥ 22 mm Hg by Applanation tonometry.
2. Neovascularization of iris or anterior chamber angle.

CASES NOT INCLUDED IN THIS STUDY:

1. Pregnant patients.
2. Patients on diabetogenic drugs.
3. History of trauma that is directly related to glaucoma.
4. Patients with visually disabling cataracts.

Patient Work Up: (The findings were recorded in the proforma prepared for the study)

1. History: Chief complaints, duration and medications of diabetes, glaucoma; dosage, duration and side effects; surgical treatment for glaucoma, if any were noted.
2. Physical Examination: General and Systemic examination done.
3. Laboratory Investigations: Blood sugar– Fasting and Post prandial Urine sugar, Glycosylated hemoglobin, Lipid profile, Blood urea, Serum creatinine were estimated.
4. General Ophthalmic Examination: (a) The visual acuity was recorded using the Snellen's chart after full correction of refractive errors and crosschecked with a pinhole. (b) Ocular

adnexa and lids, ocular movements, lacrimal passage patency were noted. (c) Anterior segment examination, using slit lamp biomicroscope was done.

Cornea: contour, diameter, any opacities or oedema is looked for.

Anterior Chamber: Reaction, central and peripheral depth (Van Herrick method)

Pupil: Size, shape, border, reaction to light, exfoliation etc.

Iris: Rubeosis, atrophy, iridectomy, heterochromia, and granuloma were looked for.

Lens: Position, opacities lens were noted.

5. Special Examinations: (a) IOP was measured using a Goldmann Applanation tonometer with a Haag- Streit slit lamp. Three readings were taken in each eye and the mean value was used. Both eyes were subjected to measurement. (b) Gonioscopy was done using the Goldmann 3-mirror lens. The Shaffers classification was used to grade the angle of anterior chamber. He suggested using the angular width of the recess as the criterion for grading and attempted to correlate this with the potential for angle closure (**Table 1**). A high risk of angle closure is associated with grade I or II iridocorneal angles.⁷

Table 1 Grading (Shaffer)

Numerical	Angle	Clinical interpretation
Grade 0	Complete or partial closure	Closure present
Grade I narrow	10° angle at recess	Closure possible
Grade II narrow	20° angle at recess	Closure possible
Grade III narrow	30° angle at recess	Closure impossible
Grade IV open	40° or more angle at recess	Closure impossible

Presence of peripheral anterior synechiae, pigment exfoliation, angle recession, and angle neovascularization were looked for. All the four quadrants of both the eyes were examined.

A. Fundus examined using Direct Ophthalmoscope, Indirect Ophthalmoscope and slit lamp biomicroscopy using +90 D lens to observe the optic disc stereoscopically to note the following points.

- i. Optic nerve head evaluation with special reference to temporal pallor, saucerization, peripapillary atrophy, splinter haemorrhage.
- ii. Cup: disc ratio, superior or inferior notching, laminar dot sign.
- iii. Blood vessels showing nasal shifting, bayoneting, barring of circumlinear vessels, neovascularization.
- iv. Nerve Fibre layer defects (using red filter light)
- v. Rest of the fundus was examined for the presence of retinopathy, neovascularization with the help of indirect ophthalmoscope.

B. Visual Fields: The visual field assessments were done with the help of Automated Perimetry using the Humphrey's Visual Field Analyzer utilizing SITA standard strategy program 30-2.

RESULTS

The present study was conducted on 1200 diabetic patients (644 male and 556 female) satisfying the patient selection criteria mentioned earlier. The mean age being 53.50 years (Figure 1).

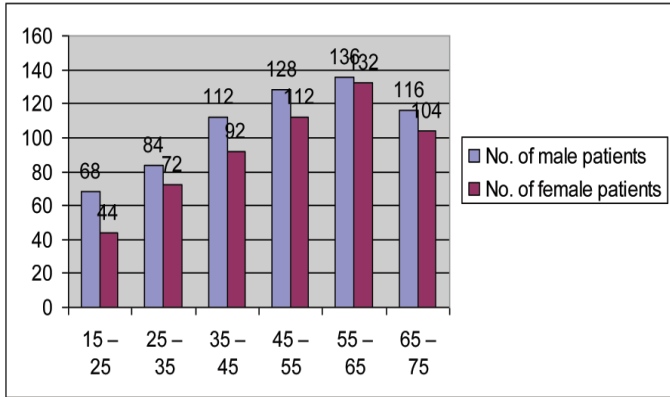


Figure 1 Age and Sex distribution

Diabetic Status: Every patient was a known diabetic; Type 1 or Type 2 diabetes mellitus was diagnosed by the physicians at the Endocrinology department and treated likewise. There were 348 Type 1 and 852 Type 2 DM patients.

Management of DM: 548 patients were on insulin, 388 patients were using Oral hypoglycemic agents (OHA) and 184 were on diet control alone at the time of this study.

IOP Distribution: 156 Patients having IOP ≥ 22 mm Hg in any one eye were recorded. Mean IOP among this group of patients: RE=23.77mm Hg, LE= 23.41 mm Hg.

DISC Changes: In 32 out of 1200 patients (2.67 %), the disc changes could not be evaluated due to mild to moderate lenticular changes along with pre retinal neovascularization and retinitis proliferans. These patients belonged to the PDR group. (Figure 2)

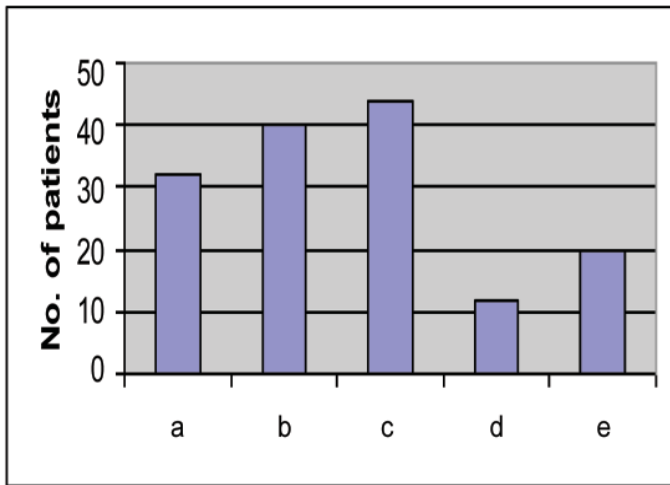


Figure 2 Disc Changes

a = Couldnot be evaluated, b= C:D<0.8,No Assymetry; c= C:D>=0.8,Assymetry<0.2;
d=C:D<0.8,Assymetry>0.2; e=C:D>0.8,Assymetry>0.2. A large group of other diabetic patients not included.

Table 2 Optic nerve head evaluation

Neuroretinal Rim	No. of patients	Percentage (%)
Temporal Pallor	64	5.33
Saucerization	20	1.67
Peripapillary Atrophy	32	2.67
Splinter Haemorrhage	24	2.00
Cup		
Notching	16	1.33
Lamellar dot sign	68	5.67
Blood Vesels		
Nasal shift	60	5.0
Bayonetting	88	7.33
Baring of CircumlinearVs	52	4.33

Visual Field Changes: Visual field assessment could not be done in 72 patients, 20 of them suffering from retinitis proliferans and 52 from Clinically Significant Macular Edema with visual acuity < 6/60 in either eye. In this study, 1128 patients had their visual field examination done. 124 showed generalized contraction of isopters due to early lenticular changes and media opacities. 12 patients were however found to have depressed retinal sensitivity due to glaucomatous damage. 44 patients were found to have isolated paracentral scotomas, of which 12 were considered significant. 84 patients were found to have glaucomatous field defects represented in Table 3.

Table 3 Visual field change distribution

Visual Field Defects	No. of patients (n= 84)	Percentage (%)
A. Generalised contraction of isopters	20	23.81
B. Enlargement of Blind spot	8	9.52
C. Isolated paracentral scotomas	12	14.28
D. Arcuate scotomas-Superior	16	19.05
E. Arcuate scotomas-Inferior	28	33.33
F. Advanced visual field loss	0	0

Ocular Hypertensive: Out of 124 patients with IOP ≥ 22 mm Hg, 40 patients (3.33%) showed neither any disc changes nor any visual field defects and are thus labeled as ocular hypertensive. Thus primary open angle glaucoma was diagnosed in 84 patients (7.0 %).

Hereditary Role:

Table 4 Relation of Family history with POAG and Diabetes

FAMILY HISTORY	POAG PATIENTS	OTHER PATIENTS
POA Glaucoma	20	16
Diabetes	24	164
Both	12	172

Neovascular Glaucoma: Among 1200 diabetic patients, retinopathy was observed in 344 patients (28.67 %). Non-proliferative diabetic retinopathy was found in 220(63.95%) and proliferative diabetic retinopathy among 124 out of 344 patients (36.05%).

Facts and figures regarding Rubeosis iridis:

- Rubeosis iridis was seen in 76 patients (6.33%) of total study population,
- 22.09% of the retinopathy group of patients had rubeosis iridis.
- All the 76 patients with rubeosis iridis belonged to the PDR group (61.29%).
- 60 out of 76 (78.94%) of patients with rubeosis iridis had angle neovascularization.

Facts and figures about angle neovascularization:

- 5.00 % of the study group had angle neovascularization.
- 17.44 % of the retinopathy group of patients had angle neovascularization (AN),
- 60 out of 124(48.38 %) of the PDR group had AN,
- All the 60 patients with angle neovascularization had rubeosis iridis.

Thus 28 patients having IOP \geq 22 mm Hg with iris /angle neovascularization or both were diagnosed to be suffering from neovascular glaucoma. All of them belonged to the PDR group. It constituted 2.33% of study population, 8.14 % of the NPDR group and 22.58 % among PDR group.

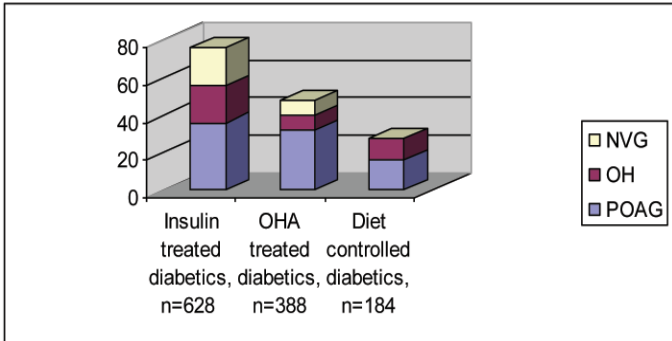


Figure 3 Relationship between the treatment of diabetes and different types of glaucoma

Thus, a total of 156 glaucoma patients were diagnosed in this study. Of which 84 patients had POAG (7.0%), 40 patients had ocular hypertension (3.33%), 28 patients (2.33%) had neovascular glaucoma. 4 patients (0.33%) were incidentally found to have narrow angle glaucoma in one eye. Their opposite eye angle were also narrow, but IOP was normal in all the 4 cases.

DISCUSSION

From the different population based studies, the incidence of POAG ranges between 1 and 2 % over the age of 40 years. The reported incidence of neovascular glaucoma (NVG) in diabetic patients with rubeosis ranges from 13 to 22%.⁶

In the present study, conducted on 1200 diabetic patients, POAG was diagnosed in 84 diabetic patients (7.0%) in the age group of 15-75 years (**Figure 1**), which was more than that as compared to general population (1-2%).⁴ This finding was close to the findings of Deepthi S & Gopal B (6.8%)⁸, and Neilsen N.V. (6%)⁹ but slightly more in comparison to that of Klein BE (4.2%)⁵ and less than that of Greco AV et al (9.26%).¹⁰

Table 5 Various worldwide studies on the relation of diabetes mellitus and POAG

Studies done on Diabetic population	Prevalence of POAG found
Waite&Beetham, 1935	6.0 %
Armstrong et al, 1960	4.1 %
Cristianson J, 1961	4.65%
Derosé L et al,1971	20.0%
Greco AV et al, 1974	9.26%
Nielsen NV, 1983	6.0 %
(Falster island,Denmark) Klein BE, 1994	4.2 %
(The Beaver Dam Eye study) Ellis J D et all, 2000	20.0 %
(DARTS, Tayside, Scotland) ¹¹ Shukla A K et all ¹² , 2009	13.9 %
Deepthi S&Gopal B ⁸ , 2015 (Thiruvananthapuram,Kerela,India)	6.8 %
Present study (Guwahati, Assam,India)	7.0 %

A hereditary preponderance of POAG was reported by Becker et al¹³ among 26% of the patients with a positive family history of glaucoma. In this study, it was found to be 23.81% (n=20, **Table 4**).

The exact mechanism of the association is not known. It could be due to a diabetes related change in the trabecular meshwork causing decreased aqueous outflow.⁵ E Marre established a disturbance of mucopolysaccharide metabolism in diabetes leading to raised IOP.¹⁴

Klein BE et al⁵, 1994 in The Beaver Dam Eye Study, Mitchell P et al¹⁵, 1997 in the Blue Mountains Eye Study, Australia and Pasquel L¹⁶, 2006 in the Nurses Health Study, UK all found a significant association between diabetes and glaucoma. The Los Angeles Latino Eye Study (LANES) by Chopra V et al¹⁷, in 2008 reported that OAG was 40% more prevalent in type 2 diabetic Latino subjects, especially those with diseases of long duration. However, Leske MC et al¹⁸, 2008 in the Barbados Incidence Study of Eye Diseases and Le A et al¹⁹, 2003 of the Melbourne Visual Impairment Project failed to conclude that diabetes was a risk factor for the development of POAG. Many other workers

like Bankes²⁰, Tielsch JM et al²¹ in the Baltimore Eye Survey did not find any relationship between diabetes and POAG.

In this study, IOP was found to be within the normal limits (<22 mm Hg) by Applanation tonometry in all the 96 patients out of 124 (77.42%) suffering from PDR without secondary neovascular glaucoma. Similar observations were made by many workers.^{22,23,24} It could be due to increased interstitial pressure and thereby decreasing transcapillary pressure. Or the condition of POAG might play a protective role in the development of retinopathy.²⁴ 3.33% patients were diagnosed to have ocular hypertension; i.e., these patients had IOP \geq 22 mm Hg in either eye without any significant disc changes or any visual field defects suggestive of glaucoma. This finding was in agreement with 3% found by Nielsen NV (3%)⁹ and 3.6% of Xu L et al²⁵ in the Beijing Eye Study.

In this study, a splinter haemorrhage was seen in 24 out of 1200 (2.0%) patients at the disc and its 28.57% amongst the POAG group. This finding was higher than that of Poinoosawmy et al²⁶, 20%.

In 32 patients out of 84 (38.09%) an inferior half visual field defect was noted (Table 4). This was also documented by Zeiter JH, 1991 (64.4%).²⁷

Neovascular glaucoma was diagnosed in 28 out of 1200 patients (2.33%) all belonging to the PDR group (n=31). This was close to the report of Nielsen NV (2.1%).⁹

In this study, the incidence of rubeosis iridis was found in 76 out of 1200 patients (6.33%; n=76). This finding was more than that of Armaly MF et al (1%)²⁸ but less than that of Yanoff (95%).²⁹ 28 patients were diagnosed to have NVG out of 76 with rubeosis (36.84%). This observation was more than that of Ohrt V (22%).⁶

The incidence of anterior chamber angle neovascularization was 60 out of 1200 patients (5.0%). All had iris neovascularization. Thus, the report of Browning DJ et al³⁰ that no eye had angle neovascularization without pupillary neovascularization was supported. However, Kevin J Blinder, Tielsch and Walsh^{31, 32} found the appearance of angle neovascularization before iris neovascularization.

POAG was seen in 8.25%, 32 out of 388 diabetics getting OHA. Ocular hypertension occurring in all the treatment subgroups almost equally. The same observations were made by Nielsen NV (Table 5).⁹ Neovascular glaucoma was more prevalent amongst Insulin treated type 1 diabetic 3.18% and same was observed by Ohrt V (3%).³³

CONCLUSION

The conclusions of this study were drawn as follows: (1) POAG was found to be more prevalent amongst patients suffering from diabetes mellitus (7.0%) as compared to the general population (1-2%).⁴ (2) Neovascular glaucoma was also found in a significant proportion of diabetics (2.33%) with PDR. (3) Ocular hypertension was also diagnosed in 3.33% patients who did not have any visual field defects or cupping of optic disc suggestive of glaucoma. (4) A splinter hemorrhage at the disc was noted in a significant proportion of diabetic patients (2.0%). (5) A predilection for inferior half visual field defect was noted amongst

diabetic patients with POAG (38.09%). (6) None of the patients with PDR were found to have POAG.

Conflict of interest: None declared

Ethical clearance: Taken

Source of funding: None declared

Declarations: (1) The article is original with the author(s) and does not infringe any copyright or violate any right of any third parties; (2) The article has not been published (whole or in part) elsewhere, and is not being considered for publication elsewhere in any form, except as provided herein; (3) All author(s) have contributed sufficiently in the article to take public responsibility for it and (4) All author(s) have reviewed the final version of the above manuscript and approve it for publication.

REFERENCES

1. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. *Br J Ophthalmol* 2006;90(3):262-7.
2. Krishnaiah S, Kovai V, Srinivas M, Bindiganavale RS, Rao GN, Thomas R. Awareness of Glaucoma in the Rural Population of Southern India. *Indian J Ophthalmol* 2005 Sep;53:205-208.
3. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Prac* 2010 Jan;87(1):4-14.
4. Armstrong JR, Daily RK, Dobson HL, Girard LJ. The incidence of glaucoma in diabetes mellitus. A comparison with the incidence of glaucoma in the general population. *Am J Ophthalmol* 1960;50:55.
5. Klein BE, Klein R, Jensen SC. Open angle glaucoma and older onset diabetes. The Beaver Dam Eye Study. *Ophthalmology* 1994 Jul;101(7):1173-7.
6. Ohrt V. The frequency of rubeosis iridis in diabetic patients. *Acta Ophthalmol* 1971;49:301.
7. Shaffer RN. Symposium: Primary glaucomas- gonioscopy, ophthalmoscopy and perimetry. *Trans Am Acad Ophthalmol Otol* 1960;62:112.
8. Deepthi S, Gopal B. Prevalence of different types of glaucoma in type 2 diabetics and non-diabetics – A comparative study. *Intl J Current Med Res* 2015 June;4(6):379-380.
9. Nielsen NV. The prevalence of Glaucoma and Ocular hypertension in type 1 and 2 Diabetes mellitus on epidemiological study of diabetes on the island of Falster, Denmark. *Acta Ophthalmol* 1983;61:662-72.
10. Greco AV, Ricci B, Ghirlanda G, Fedeli G. Diabetes mellitus and Glaucoma, *Ophthalmol Lit* 1974;26:487.
11. Ellis JD, Evans JMM, Ruta AR, Baines PS, Leese G, Mac Donald TM. Glaucoma incidence in an unselected cohort of diabetic patients: Is diabetes mellitus a risk factor for glaucoma? *Br J Ophthalmol* 2000 Nov;84:1218-1224.
12. Shukla AK, Shankar V. Are patients with diabetes more susceptible to open angle glaucoma? *Ophthalmology Times Europe* [Internet]. 2009 April; Available from: www.oteurope.com/ophthalmologytimeseurope/article/

articleDetail.jsp?id=590441&sk=date=&pageID=2

13. Becker B, Roth FD, Kolker AE. Glaucoma Family Study. *Am J Ophthalmol* 1960;50(4):557-567.
14. E Marre. Glaucoma in diabetes mellitus. *Ophthalmol Lit* 1968;22:324.
15. Mitchell P, Smith W, Chey T, Healey P. Open-angle glaucoma and diabetes: the Blue Mountain Eye Study, Australia. *Ophthalmol* 1997;104:712-718.
16. Pasquale LR, Kang JH, Manson JE, Willet WC, Rosner BA, Hankinson SE. Prospective study of type 2 diabetes mellitus and risk of primary open-angle glaucoma in women. *Ophthalmol* 2006;113:1081-1086.
17. Chopra V, Varma R, Francis BA, Wu J, Torres M, Azen SP. Type 2 diabetes mellitus and the risk of open-angle glaucoma: the Los Angeles Latino Eye Study. *Ophthalmol* 2008;115:227-232.
18. Leske MC, Wu SY, Hennis A, Honkanen R, Nemesure B, BESs Study Group. Risk factors for incidence of open-angle glaucoma. The Barbados Eye Studies. *Ophthalmol* 2008;115:85-93.
19. Le A, Mukesh BN, McCarty CA, Taylor HR. Risk factors associated with the incidence of open-angle glaucoma: the Visual Impairment Project. *Invest Ophthalmol Vis Sci* 2003;44:3783-3739
20. Banks JLK. Ocular tension and diabetes mellitus. *Br J Ophthalmol* 1967;51:557-561.
21. Tielsch JM, Katz J, Quigley HA, Javitt JC, Sommer A. Diabetes, intraocular pressure and primary open-angle glaucoma in the Baltimore Eye Survey. *Ophthalmol* 1995 Jan;102(1):48-53
22. Becker B, Bresnik G, Chevrette L, Kolker AE, Oaks MC, Cibis A. Intraocular pressure and its response to topical corticosteroids in diabetes. *Arch Ophthalmol* 1966;76:477-483.
23. Jain IS, Luthra CL. Diabetic retinopathy: Its relationship with intraocular pressure. *AMA Arch Ophthalmol* 1967;78:198.
24. Grimaldi A, Basquet F. La medicine en France 1989;35:62-65.
25. Xu L, Xie XW, Wang YX, Jonas JB. Ocular hypertension and diabetes mellitus in the Beijing Eye Study. *J Glaucoma* 2009 Jan;18(1):21-5
26. Poinosawmy D, Gloster J, Nagasubramanian S, Hitchings RA. Association between optic disc hemorrhages in glaucoma and abnormal glucose tolerance. *Br J Ophthalmol* 1986;70:599.
27. Zeiter JH, Shin DH, Back NH. Visual Field defects in diabetic patients with primary open angle glaucoma. *Am J Ophthalmol* 1991 May;111(5):581-4.
28. Armaly MF, Baloglou PJ. Diabetes and the eye. Change in the Anterior Segment. *Arch Ophthalmol* 1967;77:485.
29. Yanoff M, Fine BS. Ocular pathology: A text and atlas, Harper and Row Publishers. 1982;2:844-51.
30. Browning DJ. Risk of missing angle neovascularization by omitting screening gonioscopy in patients with diabetes mellitus (letter). *Am J Ophthalmol* 1991;112:212.
31. Kevin JB, Friedman SM, Mames RN. Diabetic Iris neovascularization. *AJO* 1995;120:393-395.
32. Tiech SA, Walsh JB. A grading system for iris neovascularization: prognostic implications for treatment. *Ophthalmol* 1981;88:1102-6.
33. Ohrt V. Glaucoma due to rubeosis iridis diabetic. *Ophthalmologica* 1961;142:356.

CASE REPORT

Pheochromocytoma: A Case Report

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ABSTRACT

Pheochromocytoma refers to the intra adrenal chromaffin neoplasm which is derived from neuroblast from neural crest. Signs and symptoms associated with pheochromocytoma are due to excessive secretion of catecholamines. 65% to 70% cases are sporadic and 30% to 35% are manifestation of inherited tumor syndromes. There is germline mutation in gene which encode B, C and D subunit of Succinate dehydrogenase (SDH). Here, we present a case of a 50 year old male patient presenting with paroxysmal attacks of hypertention, palpitation, dizziness, blurring of vision and headache for six month. Clinically he had high systolic and diastolic blood pressure. Radiological imaging studies (CT scan) and abdominal ultrasonography suggested suspected left adrenocortical carcinoma. However histopathological (HP) and immunohistochemical (IHC) examinations confirm the diagnosis of pheochromocytoma. Appropriate diagnosis of pheochromocytoma is important to avoid fatal consequences due to excessive secretion of catecholamines. Moreover, it is a cause of surgically correctable hypertension.

Keywords: Pheochromocytoma, hypertention, histopathology, immunohistochemistry

INTRODUCTION

Pheochromocytoma is an uncommon tumor originating from catecholamine secreting chromaffin cells that are derived from the ectodermic neural system and mostly situated within the adrenal medulla (0.005% to 0.1% of unselected autopsies).¹ Described by Poll in 1905 as having cut surface with dusky [phea] color [chromo]. Because of excessive catecholamine secretion, Pheochromocytoma may precipitate life-threatening hypertension or cardiac arrhythmias. Pheochromocytoma has been called the 10% tumor-approximately 10% are bilateral, 10% are extra adrenal (i.e., they are paragangliomas), 10% occur in children and 10% are malignant. The susceptibility genes for Pheochromocytoma include RET, VHL, NF1 and SDHD, SDHC and SHCB.²

CASE REPORT

A fifty years old male patient admitted in the Endocrinology

Department of GMCH with the complaints of paroxysmal attacks of hypertension along with palpitation, dizziness, blurring of vision and headache for last 6 months.

On systemic and general examination of the patient, no abnormal findings noted except high Blood Pressure (BP) during paroxysmal attacks (Systolic BP varies from 140 to 190mmHg and diastolic BP varies from 100 to 140 mmHg, with tachycardia). Complete blood count and other Biochemical investigations were normal except raised Random blood sugars (269mg/dl).

Serum catecholamine or 24 hour urinary catecholamine levels were not done because facilities were not available locally. **Abdominal USG shows** retroperitoneal mass lesion. **CT (computed Tomography) scan of abdomen report was given as** suspected left adrenocortical carcinoma. Later on Left radical adrenalectomy was done in GMCH and specimen was sent to Pathology department of GMCH for histopathological examination.

Grossly: Received one nodular light brown soft tissue mass weighing 100 gm, measuring 10x10x6 cm³ involving the whole adrenal gland. Cut surfaces were yellowish dusky red brown in colour, consistency was soft (**Figure 1**).



Figure 1 Gross picture of Pheochromocytoma

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Microscopically: Multiple random sections from the tumor mass showed capsulated tumor with predominantly well defined nested pattern (zellballen appearance) with focal areas of solid architecture separated by delicate fibrovascular network. Focal areas showed rim of sustentacular cells at periphery of some nests. Tumor cells have varying size and shape with round nuclei, prominent, nucleoli and granular amphophilic to basophilic cytoplasm. No evidence of regional or distant metastasis noted. Patient is doing well on follow up and his Blood pressure came to normal level after operation. Occasional intracytoplasmic hyaline globules also noted. Mitotic count 0-2/50 hpf. Necrosis and hemosiderin pigment deposition also noted in some areas. There was no evidence of capsular invasion and lymphovascular invasion (**Figure 2, 3**).

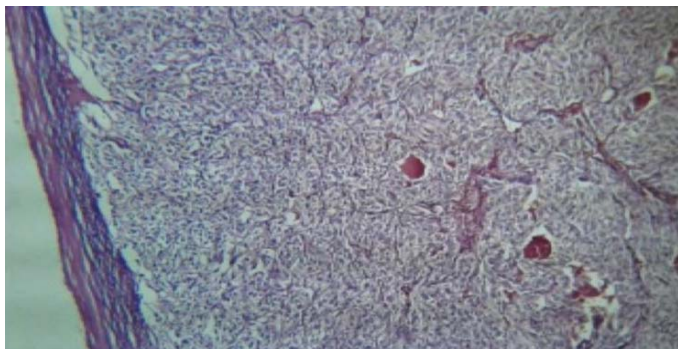


Figure 2 Photomicrograph of pheochromocytoma with capsule (H & E, 10x10)

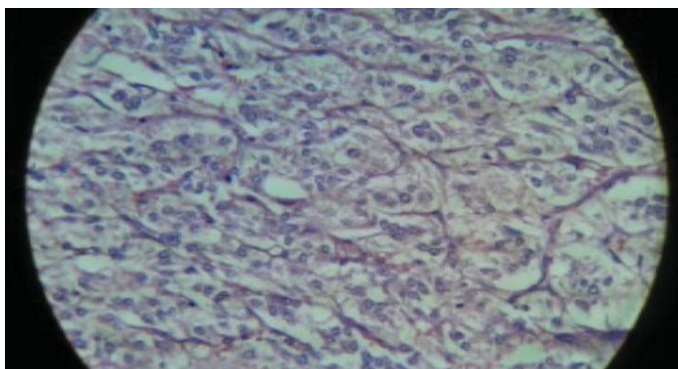


Figure 3 Photomicrograph of Pheochromocytoma, zellballen pattern (H & E, 10 x40)

Based on clinical findings, gross pathology and histopathological features diagnosis of Pheochromocytoma was made and advised for IHC confirmation. On **immunohistochemistry** the tumour was positive for chromogranin and vimentin and negative for inhibin, (**Figure 4, 5, 6**) calretinin and cytokeratin.



Figure 4 Immunohistochemistry – positive for chromogranin

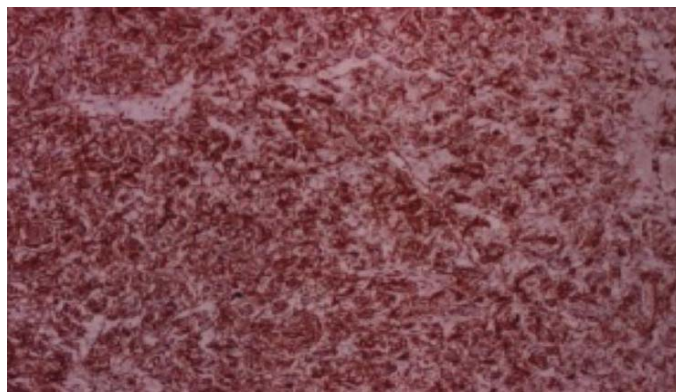


Figure 5 Immunohistochemistry – positive for vimentin

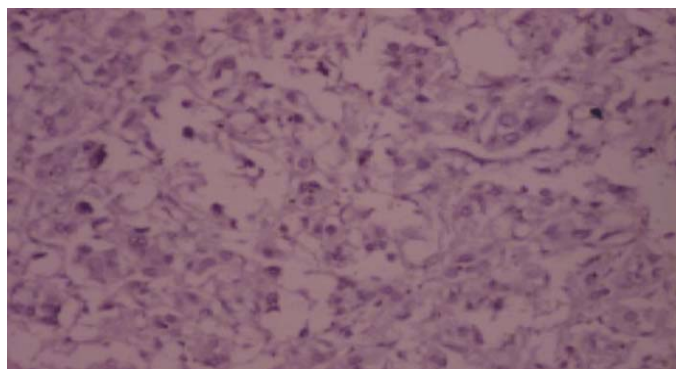


Figure 6 Immunohistochemistry – negative for inhibin

Postoperative period was uneventful with normal systolic and diastolic blood pressure levels. Patient was discharged on 7th postoperative day and now he is on regular followup without any evidence of recurrence or complication.

DISCUSSION

Pheochromocytoma is an uncommon tumor. It is also called paraganglioma of adrenal medulla (extra-adrenal tumors are called extra-adrenal paragangliomas). Common locations of extra adrenal pheochromocytomas include the organ of Zuckerkandle (close to origin of the inferior mesenteric artery), urinary bladder wall, heart, mediastinum and carotid and glomusjugulare bodies.³ Mean age of pheochromocytoma is 47 years in one series, range is 3-81 years. In children, usually extra-adrenal, bilateral and associated with MEN 2a/2b. The clinical manifestation of pheochromocytoma results from excessive catecholamine secretion by the tumor, it represents 0.1% of patients with hypertension, but may be fatal. It occurs in equal frequency in male and female. Only the presence of metastases defines malignancy.⁴ Main differential diagnoses are adrenocortical carcinoma, adrenocortical adenoma, neuroblastoma.⁵ In adrenocortical carcinoma, histopathologically there is marked nuclear pleomorphism and hyperchromasia, diffuse pattern of growth and high mitotic count. In IHC-cells are immunoreactive for inhibin, calretinin and cytokeratin. Adrenocortical adenomas are negative for chromogranin. Neuroblastomas are found in children and composed of small round blue cells often with pseudorosette formation.

Surgical resection of the tumor is the treatment of choice and usually results in cure of hypertension. Although it is the causative factor of hypertension in about 0.1% to 0.6% of the hypertensive

population detection and proper diagnosis of pheochromocytoma is mandatory, not only for the potential cure of hypertension but also to avoid the hazardous effects of the undiagnosed tumor.⁶ The massive release of catecholamines in pheochromocytoma can cause damage to heart cells. This damage may be due to either compromising the coronary microcirculation or by direct toxic effects on the heart cells.⁷

CONCLUSION

Although Pheochromocytoma is a rare cause of hypertension, early diagnosis is necessary to prevent the fatal outcome of hypertension. Most of the time radiology cannot give confirmatory diagnosis. Hence, histopathology and immunohistochemistry play important roles in confirmatory diagnosis of Pheochromocytoma, which helps in proper management of patients.

Conflict of interest: None.

Due consent from the patient for publication: Taken.

REFERENCES

1. Vinay Kumar, Abul K Abbas, Nelson Fausto. Robbins and Cotran's Pathologic Basis of Disease. 9thed. Pennsylvania 19106: Elsevier; 2014. p. 1134-35.
2. Juan Rosai. Rosai and Ackerman's Surgical Pathology. 10thed. St Louis, Missouri 63146 : Elsevier; 2004. p. 1076-78.
3. Yong L, Sheng-guo D, Zhen D, Xin -yan S. Diagnosis and treatment of Pheochromocytoma in urinary bladder. J Zhejiang Univ Sci B2007;8(6):435-438.
4. Christopher DM. Fletcher. Fletcher's Diagnostic Histopathology of Tumours. 4thed. Philadelphia, PA 19103-2899: Elsevier; 2013. p. 1308-09.
5. Gattuso Paolo, Reddy B. Vijaya, David Odile, Spitz J. Daniel, Haber H, Meryl. Differential Diagnosis in Surgical Pathology. 3rded. Philadelphia. PA 19103-2899: Elsevier; 2015. p. 448-450.
6. Lo CY, Lam KY, Wat MS, Lam KS. Adrenal pheochromocytoma remains a frequently overlooked diagnosis. Am J Surg 2000;179:212-215.
7. Greene LA, Tischler AS; Tischler. Establishment of a noradrenergic clonal line of rat adrenal pheochromocytoma cells which respond to nerve growth factor". Proc Natl Acad Sci USA 1976;73(7):2424-8.

LETTER TO THE EDITOR

Sir,

Casuistry in defense of Forensic Medicine

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Casuistry is defined as "the interpretation of moral issues, using procedures of reasoning based on paradigm and analogies, leading to the formulation of expert opinion about the existence and stringency of certain particular obligation, framed in terms of rules or maxims that are generated but not universal or invariable, since they hold good with certainty only in the typical conditions of the agent and circumstances of action".¹ The usefulness of the maxim is that it provides cash value in making a quick defensible decision respected by professionals and the law. By direct application it favors doing well to others and in case it meets an obstacle, it seeks analogy by extension. Some people are of the opinion that modern medical ethics is casuistry.

Forensic Medicine has got several sub-disciplines namely, Forensic Pathology, Forensic Serology, Forensic Anthropology, Forensic Psychiatry and Clinical Forensic Medicine. By implication casuistry would be more in tune with clinical aspect of Forensic Medicine. However, this doesn't mean that other sub-disciplines would receive an unfair treatment.

Casuistry like is an arrow ready to pierce the phenomenon of "shared insanity". In shared insanity two or more siblings go insane with the same disease. One is known as the primary insane and the other is known as secondary or inducted insane. Let it be assumed that a crime is committed by primary insane under partnership with secondary insane. Both are suffering from delusional ideas. The primary insane is the one who got the disease first. By virtue of closed proximity this disease got rubbed off on the other sibling. However detailed examination may reveal that the inducted insane have some episodes of sanity or clarity of consciousness.

In the above situation casuistry as a tool of redemption would be employed in order to do well to the deserving and identify the non-deserving. It would be useful while evaluating insanity, competence and dangerousness of the parties involved. The case is not as simple as it appears to be. Therefore by extrapolation the analogy would be sought.

The analogy quotable can be: two persons were raping a woman in secluded country side. An unknown person was walking through that way. He saw the rape being committed. Without a second thought he joined the party although he didn't have malicious thought beforehand. The trial court would seek to clarify the objective meeting action. The first two persons involved in sexual assault definitely had common intention. The third man who joined later did it on the spur of the moment. Therefore imposing punishment would be different.²

Finally, the authors would venture to say that casuistry has a definite place in Forensic Medicine too. May be the area of extended analogy be small but judicious application of mind can bring relief and succor to the aggrieved as well as definite party.

REFERENCES

1. Jonsen AR, Tontium SE: The Abuse of Casuistry. University of California Press, Berkeley; 1988. p. 257.
2. Tomlinson T. Casuistry in Medical Ethics: Rehabilitated or repeat offender? Theoretical Medicine. Kluwer Academic Publishers; 1994. p. 5-20.

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MEU of JNIMS, Imphal organized a 2-day long CME program on "Scientific Writing" on 10th & 11th Nov, 2016. Dr. Supriya Laifangbam Coordinator of MEU cum editorial board member of IJHRMLP has organized the event



Lighting of the lamp and inauguration of souvenir "Melsacon 2016" the 2nd Annual Conference of Medicolegal Society of Assam on 3rd Dec'16 at Assam Medical College & Hospital, Dibrugarh organized by Prof. AJ Patowary, Prof of FMT, AMC & Executive editor of IJHRMLP and his team



Workshop on competency based medical education was organised by the MEU of Jorhat Medical College on 3rd & 4th of Dec'16. Dr. Tejinder Singh, Convener of the MCI Regional Centre, Christian Medical College, and Ludhiana was invited as Resource faculty. Dr. Purnima Barua, Associate Professor of Microbiology, JMC cum editorial board member of IJHRMLP and her team organized the event

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